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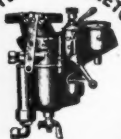
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# MOTOR AGE



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"Just Before Armageddon," a story of a pre-war tour through Belgium, will be one of the features of the next issue of Motor Age.



## In Manufacturing A Comfortable Car

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## Sulzberger's Sterilized Curled Hair

### Automobile Upholstery De Luxe

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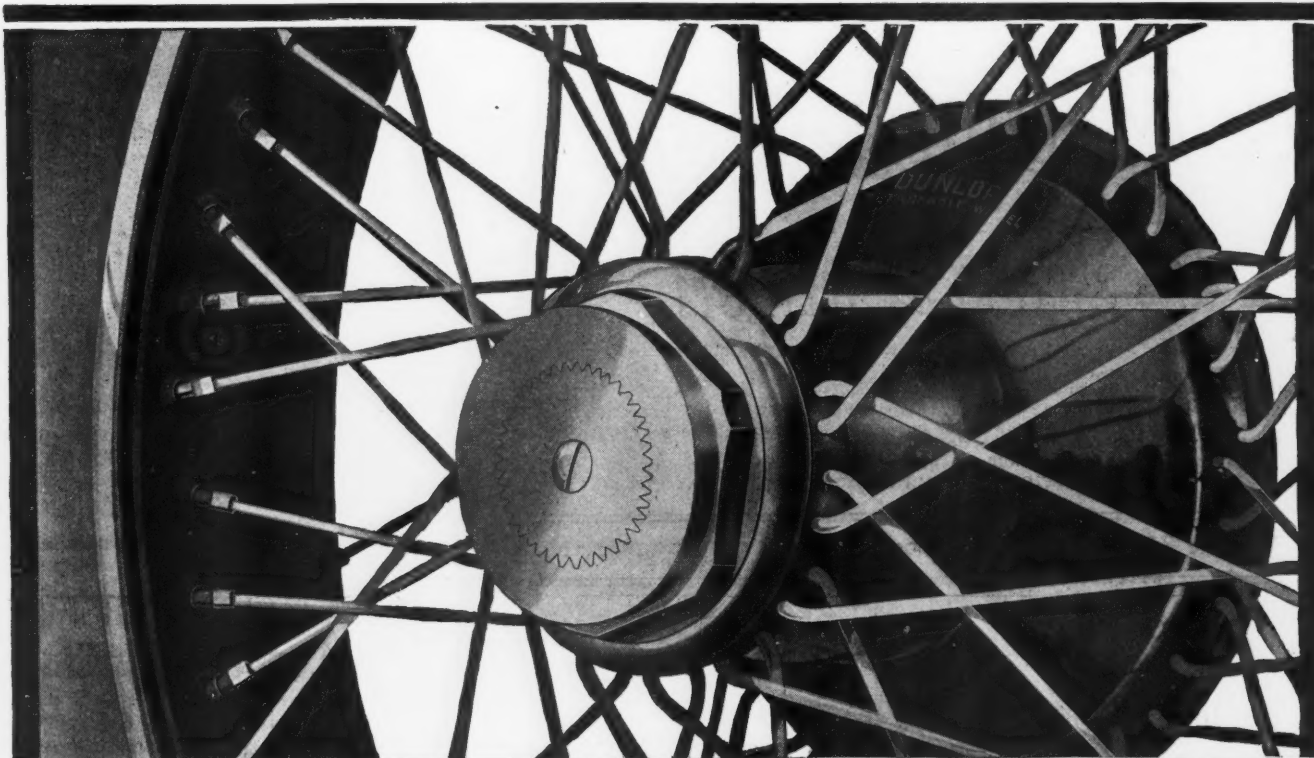
costs less than one per cent of the usual selling price of the car and considering its permanent resilience, sanitary qualities, durability and economy in filling space—car makers will find it a profitable investment for them.

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## DETACHABLE WIRE WHEELS

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# MOTOR AGE

## Chicago's Show the Usual Big Success

Annual Exhibition Starts With Record-Breaking Attendance  
—Several New Eights, Including Cole, Regal and Abbott,  
Displayed—More Cars Than at New York

CHICAGO, Jan. 25—Somewhat larger than New York in the number of exhibitors and certainly surpassing Father Knickerbocker in the matter of business done, the fifteenth annual Chicago show, conducted by the National Automobile Chamber of Commerce, under the management of S. A. Miles, opened its doors Saturday afternoon, with all but two or three exhibits in place—the finest show in the point of appearance that ever has been staged in the Coliseum and First Regiment armory.

More than 300 exhibitors are showing, most of them, of course, manufacturers of accessories and parts, and with the usual strong contingent of car manufacturers. As at New York, the truck makers are represented by proxy; that is, there is a bureau which supplies interested parties with information regarding this

branch of the industry, which, in a way, satisfies the needs of the truck makers. The gasoline passenger car section of the industry is a bit better represented than at New York, while the electric car makers as usual have saved their best efforts for Chicago, the reward for which is a segregation in the armory which enables them to make a brave showing indeed, the main aisle in the military building being given over to this one type of car.

### Layout of Big Show

There is not much deviation from precedent in the layout of the present show. As usual, Miles has the Coliseum, the main floor of which is given over to cars only; the Coliseum gallery, occupied exclusively by the accessory concerns; the Coliseum annex, which houses car exhibits on the first floor, accessories on the second, while the basement is given over to newcomers





A GENERAL VIEW OF THE COLISEUM, LOOKING NORTH ALONG THE MAIN AISLE FROM THE GALLERY

in the industry, exhibiting both cars and parts; the Greer building to the immediate south of the annex, became part of the show group at the last minute, and here Miles has installed more late-comers and some who were dissatisfied with their spaces in other parts of the show; the armory, as usual, holds many exhibitors, the car makers, including the electrics, having the main floor, while the gallery is given over to the accessory concerns.

#### English Garden Decorations

So much for the layout of the show. As for the decorations, it can be said without fear of contradiction that Miles has the finest appearing show in his history. Not only is the Coliseum itself a bower of beauty and light, but the subsidiary buildings also have been decorated in keeping with the scheme of decorations, something which was not done in other years. As a result, the entire show is a credit to the motor industry. As an example of the decorations, one might cite the Coliseum itself. Here Miles has used the English garden effect, but it differs from the one of several years ago, which was along similar lines, in that Miles has not been afraid to use white paint instead of somber black, which lights up the main building and makes it really cheerful, so light, indeed, that it is not necessary to use the incandescents in the ceiling, the big arc lights which hang from the roof

being sufficient to make it as light as day.

Inasmuch as the different booths are units all laid out alike, it is possible to describe the whole scene by outlining one of the booths. The back of each is a big white picket fence with trailing flowers of bright colors, which give the garden effect. Overhead there is the imitation blue sky with its fleecy clouds, while occasionally one encounters a huge palm—strange maybe for an English garden—which towers into the sky. Under the balconies there is a grotto-like effect secured by making the posts imitation trees with bark on them. Also there are potted plants in profusion, all tending to make the show a beautiful one.

#### Big Makers Well Represented

One finds about the same lineup on the main floor of the Coliseum as in previous years. There are the veterans of the industry—Winton, Cole, Peerless, Maxwell, Velie, Cadillac, Chandler, Studebaker, Franklin, Pierce-Arrow, Mitchell, Chalmers, Packard, Locomobile, Jeffery, Kissel, Buick, White, Overland, Hupmobile, Hudson, Regal, Oakland, Case, Cartecar,

Mercer, Willys-Knight, Moon, Stearns, Oldsmobile, National, Apperson, Saxon, Briggs-Detroit, Haynes, Marmon, Jackson, Paige and Imperial.

In the annex and on the first floor are the Auburn, Abbott, Fiat, Premier, Stutz, Herff-Brooks, King and L. P. C. In the basement are Remington, Argo, Ogren, Dort, Gadabout, Vixen and Trumbull.

#### Occupants of the Armory

Over in the armory are Moline, Metz, Chevrolet, Twombly, Lyons-Atlas, Scripps-Booth, Pathfinder, Westcott, Briscoe, Glide, Davis, Crow, Inter-State, Enger, Austin, Lambert, Allen, Pratt, McFarlan, Paterson and Lexington-Howard in the gasoline line, while the display of electrics include Baker, the American line, Milburn, Woods, Rauch & Lang and Ohio. Dodge was in this place originally, but concluded to move over to the Greer building, which permitted Scripps-Booth to get out of the basement. The neighbor of Dodge in the Greer building is the Ford, which is shown by Greer himself, a sub-agent.

Unquestionably great interest in the eight-cylinder is being displayed in the present show, especially so since several makers waited for Chicago to display their new models in this type. In this category is the Cole, which has on exhibition its first eight, brought out just in time to make its debut here. The Cole eight was described in detail in last week's Motor Age. Regal also has its eight,



which was not shown at New York, and Abbott also is another who waited for the great western show to make its bow. In addition to these the new Ross eight also is in the city, but not part of the show, it being on view at the La Salle hotel. Buda, an engine-building concern, is showing its eight for the first time, as is another motor builder, the Davis company of Milwaukee, which holds forth in the Coliseum basement. Eights which showed at New York, and which also are here, include the Cadillac, Remington and Detroit.

#### Moline Has New Motor

The Knight family has not been added to and we find those old standbys, the Stearns, Moline and Willys-Knight upholding the sleeve-valve principles. Moline, by the way, is showing a new four-cylinder Knight motor, smaller than the one it first brought out, and which will be placed in a new model, which will sell at a lower price than the present one. This motor is described more in detail in another part of the paper. There is only one exponent of friction-drive in the show—the Cartercar.

Naturally, during the early part of the show the chief interest was in the eight because of the rumors that are going around as to the converts that were pre-

### Chicago Show Statistics

GASOLINE PASSENGER CARS	
Four-cylinder models.....	120
Four-cylinder sleeve-valve.....	13
Six-cylinder models.....	109
Six-cylinder sleeve-valve.....	1
Eight-cylinder.....	11
Total.....	254
BODY TYPES	
Touring cars.....	122
Roadsters.....	42
Limousines.....	11
Coupes.....	6
Raceabouts.....	4
Sedans.....	7
Cabriolets.....	5
Broughams.....	3
Total.....	200
CHASSIS TYPES	
Four-cylinder.....	10
Four-cylinder sleeve.....	3
Six-cylinder.....	18
Eight-cylinder.....	3
Total.....	43
ELECTRIC PASSENGER CARS	
Coupes.....	20
Roadsters.....	2
Coupelets.....	2
Chassis.....	1
Total.....	25

paring for Chicago; but up to tonight no such announcement had been made, for it was known beforehand that Cole, Regal, Abbott and Ross were ready. This was told in the previous issue of Motor Age. It may be, though, that before the end

of the week there will be two or three dark horses in this division.

But the eights did not have the entire stage in the way of new models, for two other concerns waited for Chicago before putting all of their cards on the table. One of these was the Regal. The motoring world knew about the Regal eight a week before the show opened, but it did not know that the company had something else up its sleeve in the shape of a low-priced four-cylinder, which was pushed into the booth Saturday morning.

#### Regal's New Four

This is an entirely new model, a car selling at \$650, this being the first time Regal has made anything selling at under \$1,000. It is known as the small four-cylinder Regal, the motor being block-cast and having cylinders  $3\frac{3}{8}$  by  $3\frac{3}{4}$ ; a wheelbase of 106 inches; tires, 30 by  $3\frac{1}{2}$  and weighing 1,750 pounds in touring car form. Added to these features is the fact that it is equipped with an electric starting and lighting system, while the system includes top, windshield, speedometer, etc.

Franklin also came to the show with something new in the shape of a motor with the overhead valves entirely inclosed. This is a new series and differs from its predecessor in the difference in the motor noted above, in being lighter



LOOKING NORTH FROM THE SOUTHEAST END OF THE COLISEUM, GIVING AN IDEA OF THE DECORATIONS

and having more room in the tonneau.

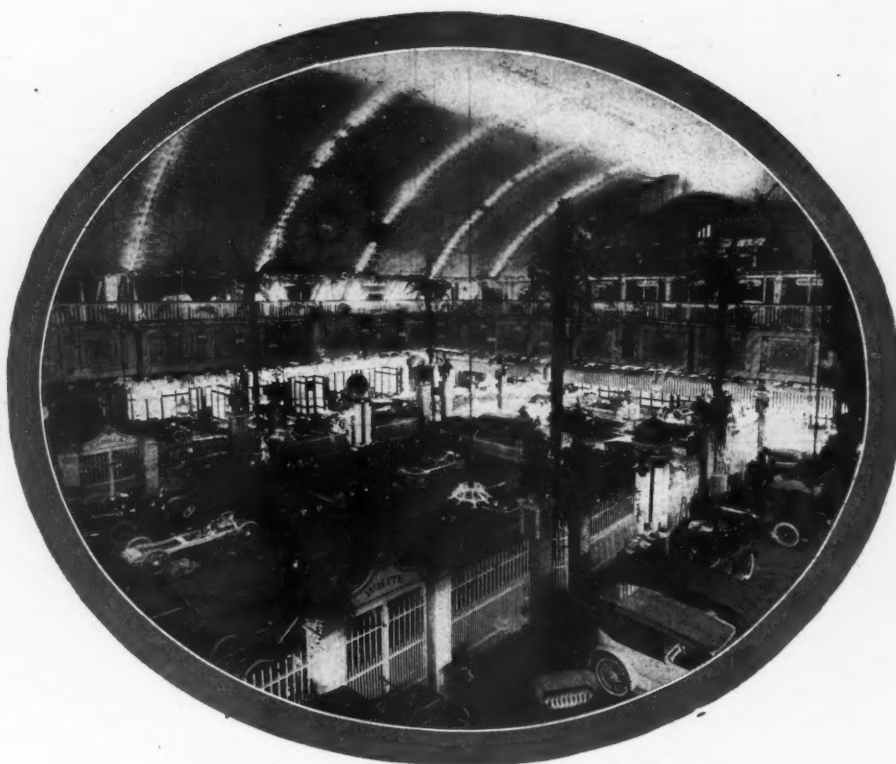
One of the first surprises of show week came from the Chandler company, which fired a broadside on Saturday when it announced that it has reduced the list price of the Chandler six, dropping it from \$1,595 to \$1,295. The reason given for this is that the company intends doubling its output and that instead of making 3,000 it hopes to make the total 6,000.

#### Census of the Show

Taking a census of the show, one finds that Chicago has seven more car exhibitors than New York had, the Windy City's total of different makes being eighty-eight, a trifle smaller than in previous years, perhaps, but thoroughly representative of the industry as it is today. Having more room, perhaps, or perhaps believing that Chicago is a more important show than New York, the makers are showing more cars as a whole than they did in the east.

When Motor Age representatives went through the show Saturday night it was found there were 254 cars on view in the show group. Of these 120 were four-cylinders, of which number thirteen were sleeve-valves. New York showed ninety-six. Chicago has 109 six-cylinders as against New York's 105, while there are eleven eight-cylinders here to New York's seven.

There are twenty-five electric passenger cars on view here, of which twenty are

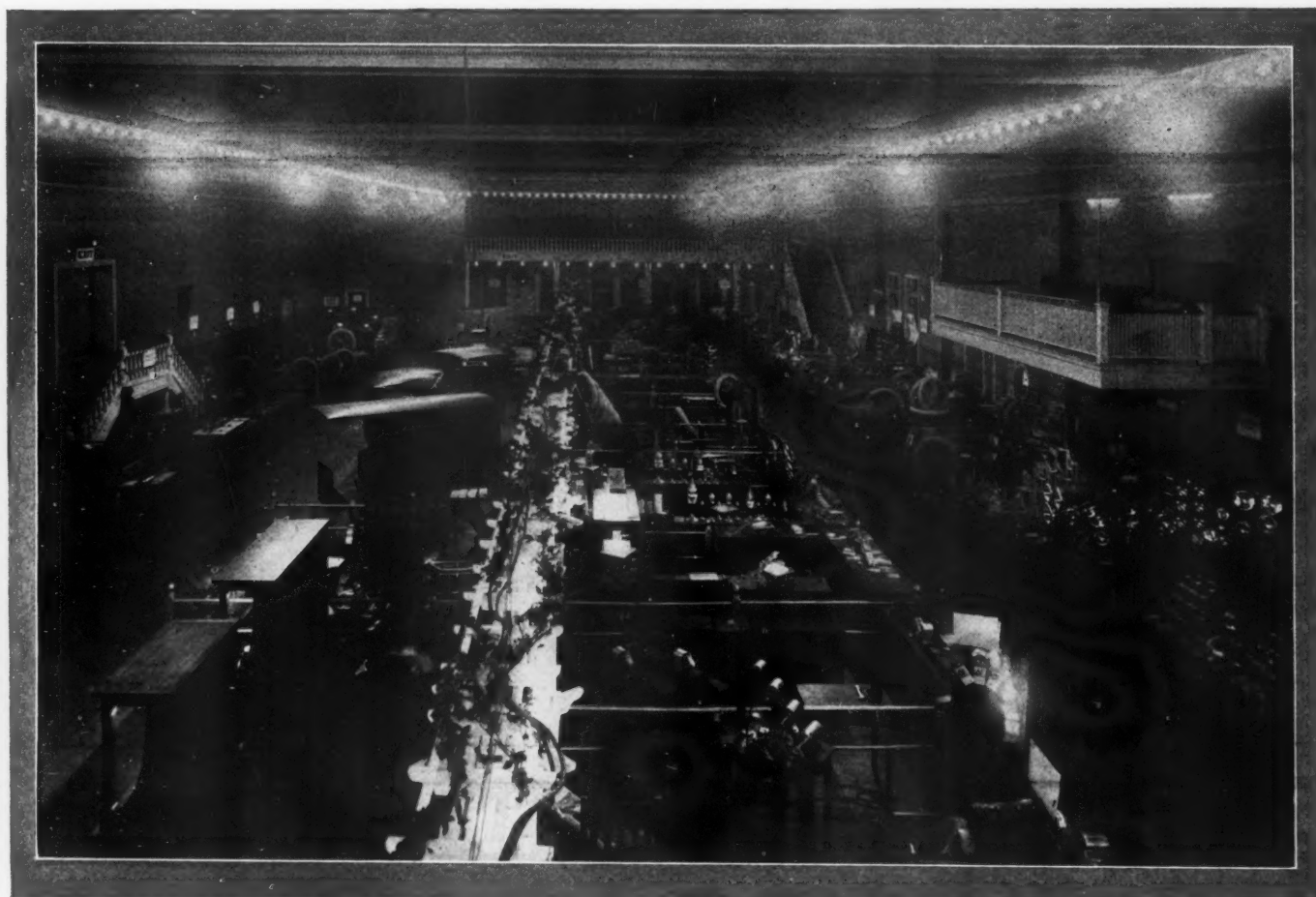


LOOKING NORTHWEST IN COLISEUM FROM EASTERN BALCONY

coupes, two roadsters, two coupelets and one a chassis only.

Unquestionably the touring car body continues to hold its own in the way of

popularity with the buying public, for of the 200 body types noted there are 122 touring cars. There are forty-two roadsters, eleven limousines, six coupes, four



SECOND FLOOR OF COLISEUM ANNEX, WHICH HOUSES MANY EXHIBITS OF PARTS AND ACCESSORIES





VIEW TAKEN FROM EASTERN BALCONY OF SOUTHERN END OF COLISEUM

raceabouts, seven sedans, five cabriolets and three broughams.

There are forty-three chassis in the show. The general use of chassis, most of

them highly polished and nicked with attractive painting, is to be commended. There can be no doubt that a great many interested prospects know good construc-

tion from bad, and the showing of the whole mechanism pays. Nineteen four-cylinder chassis with poppet motors are shown, eighteen sixes and three eights. Then there are three four-cylinder Knight-equipped chassis, as well as one electric. As a general comment, it might be said that the electric vehicle makers would do well to emulate the gasoline contingent to a greater extent in this. The man buying an electric may have all confidence in the construction of the chassis, but at the same time he generally likes to see it.

#### Interesting Displays Made

In nearly all cases where chassis are not shown, there is a motor or some other distinguishing thing of the chassis construction on view. The Woods electric has its worm drive running in a glass case with a prony brake in connection with a large dial scales to show how small is the power loss through transmission in its gearing. This is educational and convincing. Not satisfied with saying that the weight of its small six is a certain figure. Hudson has fitted up a large scales in its booth. On this is the six-40, with a big readable scale showing the actual weight. The same feature was carried out in New York.

As a general thing, the elaborate show cars of the past have disappeared from the Chicago show. There is a surprising number of exhibitors who have not even painted their cars in anything but stock



MAIN AISLE IN FIRST REGIMENT ARMORY, GIVEN OVER EXCLUSIVELY TO ELECTRIC PASSENGER CARS

colors, preferring to let the visitor see just what the car would look like if ordered with regular factory painting. Locomobile, Packard, White, Paige, Apperson, Cadillac, Moon, Oakland, Buick, Saxon, Chalmers, Pierce and many others have one or more cars with painting in striking colors, but there is nothing of discordant nature about any of these.

Many beautiful limousines, sedans, coupes and cabriolets are displayed. Locomobile shows several Brewster inclosed bodies which are the acme of elegance without being gaudy. One of these is a brougham, the other a limousine. Packard has a sedan which is the envy of many. Pierce is showing a coupe with a very beautiful interior, the newest point of which is the hinged steering wheel, making entrance or egress from the driver's seat a simple matter. This differs from the forms brought out by two other makers, namely Cadillac and King, in that the wood rim itself hinges on either side, rather than the whole rim swinging out of the way. The lower part folds over onto the upper part.

As usual there are the usual luncheons and dinners for the visiting dealers. Overland has its big dinner at the La Salle tonight, while White has a session at the Metropole. Chalmers has a luncheon tomorrow at the Auditorium, while the Electric Vehicle Association holds forth at the Metropole. Saxon, Franklin and Dodge have selected Wednesday for its gathering, while Mitchell will take a big delegation to the factory that day. On Thursday Jeffery, Briscoe and Crow have dinners and on Saturday night, the windup of the show, Chandler will hold forth at the Congress.

Among the meetings scheduled for the week is the gathering of the garagemen at the Lexington on Wednesday, when an effort will be made to form a national organization. The Chicago Automobile Trade Association has called a meeting for Thursday, when it will bring together representatives of trade associations of western cities for the purpose of nationalizing its used-car report, a meeting similar to the one held in New York during the show there.

with gambling houses, saloon, dance hall and jail. Each guest was furnished with \$500 in phony money with which to gamble and each wore a sombrero and red bandana handkerchief.

The speakers included John N. Willys, who leaves tomorrow for the Pacific coast for a vacation; Isaac Kinsey, vice-president of the Overland company; Alfred Reeves, general manager of the National Automobile Chamber of Commerce, and Charles Y. Knight, inventor of the sleeve-valve motor. An interesting part of Mr. Willys' speech was his reference to a huge chart which showed the growth of the Overland plant at Toledo from 1909 to the present day. It is such a mammoth affair now that if it were converted into a one-story saw-tooth building 100 feet wide it would spread out for 8 miles.

#### VULCAN DECLARED BANKRUPT

Cleveland, O., Jan. 25—Following a creditors' petition to have the Vulcan Mfg. Co., a Painesville motor car corporation, declared bankrupt, United States District Judge Clarke appointed Attorney Carl D. Friebolin receiver. Mr. Friebolin says the company will make an offer of settlement with the 400 creditors on its books.

The involuntary bankruptcy action was filed by Attorney Louis J. Grossman, representing the creditors. He maintains the liabilities of the Vulcan company are in excess of \$100,000 and that the company's officers have been endeavoring to straighten out its financial difficulties through the sale of property not affected.

The Vulcan company was organized about 2 years ago and capitalized for \$200,000, establishing its plant at Painesville for the purpose of manufacturing a low-priced car. The factory employs about 160 men and is Painesville's largest industry. Its directors are E. D. Heartwell, F. H. Murray, J. C. Ward, William Truby, and H. E. Hammer.

The federal court will appoint three appraisers to estimate the company's assets. When this is done the directors then will decide upon an offer to creditors, according to Mr. Friebolin. He said the company was preparing to open a factory branch in Cleveland and that orders on hand and unfilled total more than 1,000 cars. Mr. Friebolin believes a readjustment will be effected within a month.

#### LINDSAY SUES WINTON

Cleveland, O., Jan. 25—The Lindsay Auto Parts Co., Indianapolis, Ind., brought suit in United States district court, Cleveland, Thursday, January 21, against the Winton Motor Carriage Co., charging infringement of driving axle patents. The action asserts that patents were issued to Thomas J. Lindsay May 9, 1898, for a driving axle invention; he assigned to William Harmon, then both assigned to the Lindsay Auto Parts Co. Losses to the extent of \$3,000 have been suffered, according to the bill of complaint.

## Big Detroit Show Declared a Winner

### Good Business Done, Wolverines Report

**D**ETROIT, Mich., Jan. 23—The show which closed Saturday is declared to have been the best business affair Detroit exhibitors ever had. What makes the results the more noteworthy is the fact that few of the dealers thought that the people would come so far out from the center of the city. It proved better than any other argument that the motor car no longer is a vehicle for pleasure only but is regarded by the purchaser of the passenger cars just as by the purchaser of the commercial cars as something useful, worth while having, a time and money-saving device.

As far as the commercial car section of the show is concerned, it was the biggest display of this class of motor vehicles ever shown in conjunction with a passenger car show and it was visited by more people interested in trucks and delivery cars than had been anticipated. Many orders were taken and if the figures given by dealers and salesmen are correct then more than 100 vehicles were sold.

Dealers from many parts of the country attended. The fact that practically every hotel in the city was filled all week indicates this. An estimate is difficult but at one hotel it was said that more than 150 people interested in motor cars had registered and that most of them came from the middle west and south. One of the local distributors stated that sixty agents and sub-agents had come during the week; another one stated that the factory convention had brought more than 150 dealers from all over the United States and a third one said that fully eighty to 100 dealers from Michigan and Ohio had come.

During the week several banquets, dinners and conventions were held. The King Motor Car Co. gave its annual dinner to the parts and accessory manufacturers who furnish either parts or accessories for the building of the King cars. Including the officials of the company there were 135 guests.

About fifty members of the selling force of the Champion Spark Plug Co., Toledo, O., and the Jeffery-Dewitt Co., Detroit, held their convention, visited the plants of the King Motor Car Co. and Ford Motor Co.

At the Tuller a banquet was given by the Olds Motor Works, Lansing, Mich., it being attended by more than fifty members of the organization which makes the Oldsmobile.

The Edelweiss cafe was the rendezvous for the banquet given by the Paige-Detroit Motor Car Co., to its dealers from the middle west, more than 150 being present.

From January 20 to 22 the annual dealers' convention of the Federal Motor Truck Co. took place. More than 150 attended and some came from all the states in the union. The banquet was served at the Pontchartrain.

#### OVERLAND GIVES UNIQUE DINNER

Chicago, Jan. 26—The show week dinner of the Overland company, held tonight at the La Salle was a record-breaker in the way of attendance, there being more than 600 guests, most of them dealers. In the way of a novelty the company had a wild west entertainment before the dinner, the eighteenth floor of the hotel being converted into a western mining camp,



# Important Ball Bearing Suit Up in Cleveland Court

## Chalmers Agent Defendant in Patent Case

CLEVELAND, O., Jan. 25—Final hearing of the patent infringement action brought by the American Ball Bearing Co., Cleveland, against Edward B. Finch, former representative of the Chalmers Motor Co., opened Monday in the United States district court before Judge John H. Clarke. An array of legal counsel is appearing on each side, evidence of the suit's importance to motor car manufacturers.

Representing the American Ball Bearing Co. are Edward R. Alexander, Cleveland; Livingstone Gifford, of New York; Edward Rector, of Chicago, and the Cleveland law firm of Hoyt-Dustin-Kelley-McKeehan & Andrews. Representing the defendant are F. P. Fish, Boston; W. A. Redding, New York; Whittemore, Hurlburt & Whittemore, Detroit, and A. L. Thurston, Cleveland.

The evidence offered Monday reviewed that presented at previous hearings and adjournment was taken until Tuesday when it was expected the case would settle down to the legal argument.

The American Ball Bearing Co. brought suit March 5, 1913, alleging in its bill of complaint that Edward B. Finch, as a representative of the Chalmers Motor Co., and the Metal Products Co., urged and induced the use of anti-friction bearings in Chalmers motor car construction, in alleged infringement of patents issued to Walter C. Baker and assigned to the American Ball Bearing Co. The patent is No. 753,820 and was issued February 24, 1902, according to the complaint, and has to do with the efficiency of the steering axle of a motor car.

Licensees of the American Ball Bearing Co. include the Lozier Motor Co.; Pierce-Arrow Motor Car Co. and the Baker Motor Vehicle Co., according to the bill of complaint and an offer was made the defendant, on behalf of the Chalmers Motor Co., to adopt the patent, the papers filed in the case allege.

The action filed June 25, 1913, by the Kardo Co., substituting for the American Ball Bearing Co., against Henry J. Adams, former representative and at that time dealing as the Reo Motor Sales Co., is on the United States district court calendar for hearing Wednesday. The same attorneys will appear in this case, it is probable. Kardo, following up the American Ball Bearing Co.'s suit, alleged infringement of patent No. 792,690 issued to Alanson P. Brush, of Detroit, for bevel-gear driving and compensating mechanism.

The bill of complaint established that Brush assigned to the Baker Motor Vehicle Co. and the Baker Motor Vehicle Co. assigned to the American Ball Bearing Co., with the patents of the latter corporation now under the control of the Kardo Co. Transfer of the suit was made to the

Kardo Co., October 3, 1914, it will be remembered.

Cleveland, O., Jan. 26—Witnesses called by the defense in the action of the American Ball Bearing Co. against Edward B. Finch, representing the Chalmers Motor Co., Tuesday, included Walter C. Baker, Howard E. Coffin, B. B. Gray, Philadelphia, with the Standard Roller Bearing Co.; Herbert N. Rich, Cleveland; B. I. Tuttle, Springfield, O.; B. B. Neuteboom, Detroit; James G. Heaslett, Detroit, vice-president of the Studebaker Corp.; F. C. Hinkley, of the Chalmers company, was present.

Prior art testimony adduced by the defense was offered to show that Chalmers ball bearings and steering axle were in use previous to the patent grant on which the complaint alleges infringement.

Judge Clarke will hear the final arguments and probably render a decision Wednesday.

### SUES ON TIRE-CARRIER PATENT

New York, Jan. 25—The Garage Equipment Mfg. Co. has brought suit against the Charles Weiland Co., charging infringement of its patent No. 46,360 covering a tire-carrier design for motor cars.

The bill of complaint states that Grant F. Discher, Milwaukee, Wis., assigned his patent on this design to the Garage Equipment Co., June 10, 1914, and that the latter company received a patent on it 7 years from September 8, 1914. The Garage Equipment Mfg. Co. asks for a preliminary and a final injunction; that all of the alleged infringing devices now in the possession of the Weiland company be destroyed, or turned over to it for this purpose; that the court compel the Weiland company to make an accounting of the alleged profits from the sale of the device, and that such damages be tripled.

### HOLDS SEAT PATENT INFRINGED

Detroit, Mich., Jan. 22—A decision was rendered yesterday by Judge Tuttle, of the United States district court, holding that the Jackson Cushion Spring Co., Jackson, Mich., is infringing the patents granted Theodore L. A. Adler and William G. Sullivan covering spring construction for motor car back seats.

The plaintiffs—Adler and Sullivan—filed their suit against the Jackson concern May 21, 1913. Adler claimed that previous to November 24, 1909, he was the first and original inventor of a certain new and improved spring construction and that he filed application with the United States patent office November 24, 1909, one half interest in his invention being assigned to Sullivan. Under date of May 2, 1911, letters of patents were granted to them bearing No. 991187. They claimed that the

Jackson company has copied their invention, made and sold it.

The Jackson Cushion Spring Co., denied the allegations and claimed that prior to Adler and Sullivan, Leonard A. Young, of Detroit, had invented a similar device for which he filed an application for letters of patent November 1, 1909, which application has been in interference with the Adler and Sullivan patent but which was decided in favor of Young by the United States patent office, thus rendering patent No. 991,187 void.

### DECISION AGAINST COLLINS

Detroit, Mich., Jan. 25—A jury in Judge Mayne's Wayne county circuit court has awarded \$20,000 damages to William A. Paul, an inventor of a curtain holder pertaining to the use of inside curtains for motor cars against Jeffrey N. Collins, John A. Bennett and the Novelty Leather Works, all of Jackson, Mich.

It was claimed by Paul that prior to July 1, 1912, he conceived and invented "a certain curtain holder pertaining to the use of inside curtains for motor cars," that he made a working model, showed it and the plans to Collins and made actual demonstrations for the purpose of securing the financial aid of the Collins company, the Novelty Leather Works, to be able to get letters patent and market the device.

It was agreed, so Paul claimed, that in consideration for allowing the Novelty Leather Works to make and sell his invention he was to receive 25 per cent of the receipts of the business derived from his invention. Plaintiff also claimed that Collins and Bennett conspired to defraud him out of his right and that patent No. 1,066,448 filed by Collins July 22, 1912, and granted to him July 1, 1913, was his—Paul's—invention.

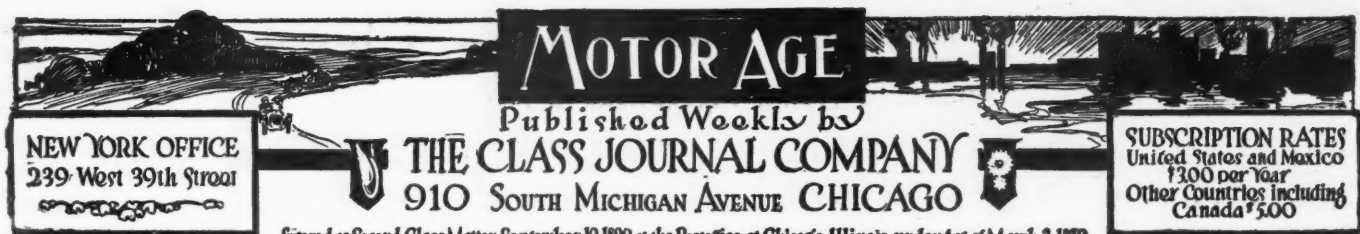
Plaintiff Paul asked for \$50,000 damages. The jury allowed \$4,500 as back royalties and \$15,500 as future royalties.

During the trial witnesses who had worked with Paul in the shops testified that they saw him work on the drawings and invention and explain its operation to Collins.

The case will be appealed, the attorneys for Collins and Bennett claiming that the circuit court has no jurisdiction and that the case should have been heard in the United States courts.

### ARMY TRUCK BILL PASSED

Washington, D. C., Jan. 23—The army appropriation bill, carrying \$101,000,000 was passed by the house today. The bill which carries funds for the maintenance of all branches of the army during the coming fiscal year, includes \$50,000 for armored motor cars.



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## Progress of the Eight-Cylinder

THE show this week in the Coliseum is gradually more and more crystallizing the question of cylinders, the sentiment gaining in many sections at the show that the eight is coming much stronger and faster than was anticipated a month or so ago by the most optimistic. On the surface the eight is this week meeting with many favorable comments, due to certain apparent advantages possessed by it, such as shorter space occupied than in six-cylinder cars of the same piston displacement. This is a most considerable factor, particularly for cars for city use. The possibility of cutting 10 inches off a wheelbase means much to a city driver. Not only does it mean a shorter car but it means a little more room if necessary in the tonneau and yet a quite shorter wheelbase.

ALL of the exhibitors of eights are talking strongly the reduced cost of maintenance as compared with the six. Practically every exhibitor of an eight mentions that it can be made cheaper than the six, one maker going so far as to say that it can be made almost as cheap as a four. Figures on this should interest the manufacturers.

WHEN the eight is viewed from the point of weight it is also attractive. Some makers have the eight weighing less than the six of equal displacement, and others, who have not specially worked to cut down weight in their new eights, have been able to build it at the same weight as the six.

THE advocates of eights are not overlooking the shorter crankshafts, the shorter crankcases, and shorter camshafts as compared with six construction, in fact, they are loud in their praises of the fewer obstacles in the engineering field that have to be contended with in developing the eight as compared with the six. The shorter shafts mean greater rigidity and less susceptibility to

vibration, which is to be guarded against in rotating parts of any motor.

THE old cry of lack of accessibility in the eights has been met in a very efficient manner by not a few of the latest designs and it is a compliment to American motor engineers that in so short a time they have been able to bring accessibility out of the chaotic condition it found itself in a few months ago and bring it onto a par with that existing in present six-cylinder and four-cylinder constructions. It is because of the simpler problems involved in the eight and also the activity of the motor engineers that in a few short months the eight has made such unexpected progress.

IT is not to be expected that the eights have passed all the breakers, in fact, they resemble very much the proverbial young bears setting out with all of their troubles before them. Very few of the many eights developed have been put through long endurance tests. Several of those exhibited have scarcely done any work before being put in the show. The prospective buyer must bear this in mind. At the present time several of the eights are being started on tests and in a few weeks or months we may hear of some of the inherent troubles that must be overcome.

IN the meantime the public is being quick to see the possibilities of the eight and it will be surprising if the eight, after it gets properly combed out by the engineering and testing departments, does not quickly take its place in the car field. One fact which will facilitate its introduction is that for the present it does not call for the layout of a new chassis, in that it can be installed in the same chassis used for a four-cylinder job. In other cases it is being adopted in chassis previously carrying six-cylinder motors, the shorter space needed for the eight being used for additional leg room.

## Shows Becoming More Cosmopolitan

IT is evident to one who has visited many of the annual motor car shows that the visitors are a more cosmopolitan lot from winter to winter. Go back 5 years and compare the crowd of that exhibition with the following of today. The rich man still is here, but he is not the only live prospect which the exhibitors recognize. The man of lesser means also is on hand and in nine cases out of ten, if he devotes an afternoon or evening to the show, he is ready with a check for the best car of which his means will permit. Of course, there is the usual percentage of curiosity-seekers, but we are not considering them in this reckoning.

THERE are reasons for the change in the show visitors' general personnel. Perhaps the first is that car prices have come in for marvelous reductions within a few seasons, this bringing good cars within the reach of the moderately-situated man. Even the man who has only \$300 to \$500 to invest can find a big list of makes within his range. The lowest-priced car at the present show is \$295. Who could buy a serviceable buggy and horse for that amount?

ANOTHER reason is that the man who thinks twice over any purchase, not because he is specially handicapped financially, but because he does not want to pay money for anything unless he gets full value received, is now realizing that he can buy a motor car with real service in it. He has but to look over the chassis on view to tell, if he is mechanically inclined at all, that they are built for continuous operation and are not going to be in the repair shop half the time.

THE large increases in show attendance from year to year are not due to any special increase in the number of persons of means who are in attendance, but rather to the large percentage of those in more moderate circumstances who can afford to buy.

IT is evident at this show that the motor car is interesting many in this class and these same indications point to a vast increase in the number of sales during the coming year. The show seems to be a true barometer.



# 2,800,000,000 Gallons to be 1915's Gasoline Demand

## Petroleum Industry Expects Record-Breaking Fuel Production

PITTSBURGH, Pa., Jan. 26—Of interest to motorists are the comments of the Oil City Derrick, the mouthpiece of the petroleum industry, in the matter of gasoline consumption in 1915. This authority says:

"In 1914 there were registered in the United States 1,808,441 motor cars, or 680,501 more than in 1913. At the same rate of increase the number in 1915 will be 2,488,962, and it is safe to figure that at least 2,400,000 will be running in the early spring. This means an investment by the owners of motor cars of at least \$1,800,000,000.

"To the oil trade the interest in the figures is in the increased demand for gasoline to run the cars. One of the best authorities in Oil City on the consumption of gasoline per car per year gives the amount as 583 gallons. In this figure the fact that the machines are laid up in this locality more days in a year than those of the south or California, is taken into consideration in arriving at the general average, and also that the large trucks used in the cities and on road work consume an average of 12 gallons for a working day or about 3,600 gallons a year each. The estimate for the average is, therefore, conservative and can be relied upon in making estimates.

"Taking the figure as given above, the 2,400,000 cars will require 1,399,200,000 gallons of gasoline in 1915, to say nothing of the lubricating oil to keep the bearings in proper condition. It may be assumed that the motorcycles, motorboats, aeroplanes and gasoline engines will require for their use as much more, so that it would be fair to estimate that the demand for gasoline in the United States during 1915 will be approximately 2,800,000,000 gallons, or 56,000,000 barrels at 50 gallons to the barrel.

"During 1914 approximately 200,000,000 gallons of gasoline and naphthas were exported, or 4,000,000 barrels. Adding this to the American estimate would give a total of 60,000,000 barrels during the present year, allowing for no increase of the needs for the article from abroad. This would be practically 20 per cent of the total production of crude oil in the United States in 1914, as given by the Geological Survey at 292,000,000 barrels. This includes fuel oil of about 92,000,000 barrels, so that the percentage on the amount of petroleum from which gasoline can be profitably produced would be 10 per cent, which is more than could be obtained, it is estimated.

"But the growth in the production of gasoline from natural gas, known as the casinghead-process, has been so rapid within the last 5 years that the supply is no longer dependent upon petroleum. The

production of gasoline has also been increased by new methods, by means of which a large amount is derived from heavy oils."

### THOMAS VICTIM OF RED TAPE

Paris, Jan. 15—Rene Thomas, pioneer race driver, motorcycleist, aviator, winner of the Indianapolis 500-mile race and successively member of the Peugeot, Schneider and Delage racing teams, successfully passed the government driving examination today and was given a license entitling him to drive a 12-horsepower car in any part of France and colonies. When brought in contact with the military authorities, some weeks ago, it was discovered that Thomas held a 12-year old driving license for a 3½-horsepower Lacoste & Batteman car, and that he was acting illegally in placing himself at the wheel of a 12-horsepower Delage, with which he intended to serve in the army. All attempts to prove to the official that Thomas

secured his driving license in the early days when a 3½-horsepower machine was considered the maximum suitable for the roads and that he had long outgrown the official regulations were in vain. The gold-braided authority threatened to put the race driver under arrest if he found him at the wheel of any other machine than a 3½-horsepower Lacoste & Batteman. The result was that Thomas had to present himself for examination.

### WAR ORDER FOR KELLY-SPRINGFIELD

New York, Jan. 27—Special telegram—Practically after 2 months of investigation and delay the Canadian government has placed an order for 150 trucks for war purpose with the Kelley-Springfield Motor Truck Co., Springfield, O. J. L. Geddes, president of the company, states the trucks are of the 3½-ton type and that the order calls for thirty trucks a month until the war is ended.

See America First —  
• • • See America Now



EDITOR'S NOTE—This is the eleventh of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be run in Motor Age with the idea of calling the attention of motorists to the picturesque points of interest in their own country.

### NO. 11—THE SAN GABRIEL MISSION, NORTH OF SAN DIEGO, CAL.

Only a short distance north of San Diego on the Pacific boulevard, a motor road that follows California's shore line and forms a thread on which the Spanish padres strung the beads in their rosary, is the San Gabriel mission, erected in 1771, and the fourth mission to be established in California by Father Junipero Serra, the father of California's historic houses of worship. The story of its founding reads like a miracle. The Franciscan friar, accompanied by a guard of ten soldiers and several brown-robed brothers, first erected a wooden cross on the site and sprinkled the ground with holy water. The attitude of the Indians was so hostile, however, that the band prepared for an attack, an attack in which it probably would have suffered annihilation had not one of the missionaries thought of a large banner, on which a picture of the Virgin was emblazoned, and suddenly unfurled it. The effect was instantaneous. The savages threw down their arms and coming forward, prostrated themselves at the feet of the padres.

# Motor Car Reserves Formed by California Enthusiasts

## Men in Industry Go Into Military Organization

LOS ANGELES, Cal., Jan. 22—An organization was perfected here today which in all probability will play an important role in the military operations of the United States if this country is ever so unfortunate as to become entangled in an international controversy. With a membership of fifty expert mechanics, motor car engineers and drivers, among whom are many of the most prominent motor car men in this section, the Motor Corps Reserve sprung into existence and promises to become one of the most successful military reserve organizations in the country.

For many months prominent motor car men of Los Angeles have been working toward the organization of a military motor corps which might prove of service to the country in time of need and a stimulant to the military spirit in time of peace. Shortly before the outbreak of the European hostilities, when the local state troops were sent to the Mexican border, it was believed that an organization would be effected, but the time was not ripe and only today the plans of the organizers of the Motor Corps Reserve were realized.

Captain Harmon D. Ryus, veteran of the Spanish-American war, winner of the first Los Angeles to Phoenix road race and one of the pioneer motor car men of southern California, is in command of the motor reserves and retains the rank of captain. Ryus has been working on the organization for some time and was recognized as the most desirable man for the place of commanding officer.

### Officering the Corps

There are to be two lieutenants commissioned but these officers have not been selected. There are to be a first sergeant and quartermaster sergeant with four duty sergeants and six corporals. The lieutenants, sergeants and corporals are all to be elected by members of the organization rather than by appointment, as is the practice in the regular army and the organized militia in this country.

One of the lieutenants is to be an infantry expert, while the other will assist Captain Ryus as a motor car engineer. The non-commissioned officers are to be selected from the most efficient in their lines of service.

It is hard to estimate the value of such an organization in case of an invasion. For coast patrol duty the motor reserves should prove as efficient as any branch of the regular army or militia. With a fleet of serviceable motor cars and trucks attached to his command, any general officer should appreciate the value of the trained motor car engineers and drivers who make up the personnel of the Motor Corps Reserve.

Not only will the members of this volunteer motor corps be experts in the handling, building and repairing of motor cars and

trucks, but they will be experts with the rifle and revolver as well.

William R. Ruess, known throughout southern California as "Wild Bill," is one of the best revolver shots in this section of the state and is also an expert rifleman with the high power government rifle.

Joseph H. McDuffee, for many years in the motor car business in New York city, is an amateur champion with the rifle. B. L. Graves is recognized as one of the best military riflemen in the state, while Frank S. Howard, Harold Tuttle and Captain Ryus are all revolver experts.

E. C. Crossman, for several seasons champion of the California national guard and a member of the state team for 3 years, has retired from the national guard of the state to join the Motor Corps Reserves. Crossman also is an excellent driver and was the first man in the United States to fire a military rifle from an aeroplane while flying.

### Hanshue a Recruit

Harris Hanshue, winner of the first Santa Monica road race, and Harry Herrick, twice winner of the Phoenix desert race and winner of the 1911 Santa Monica classic, are both members of the organization.

Reeve Gartzmann, C. H. Smith, "Firestone" Smith, O. B. Henderson, Lynn C. Buxton, L. V. Starr, Al G. Faulkner and Ed F. Harris, all well known motor car men, are members. Don Lee is a popular candidate for the office of first lieutenant. T. J. Stoner and Watt Moreland, are the motor truck experts who are enthusiastic members of the organization, which claims more popularity than any of the state commands, including the famous Los Angeles light battery.

Besides the great number of motor car men, there are a number of private owners who are on the muster sheet. A large percentage of the members of the command have seen service either in the United States volunteers or in the national guard organizations of the states and with a large waiting list, the pioneer American motor command should gain nation-wide recognition within a short time.

The uniform of the corps is almost the same as worn in the field by the American soldier. Olive drab trousers, English puttees, olive drab shirts and heavy drab sweaters. The sweaters were thought to be more serviceable than the regulation military blouse and instead of the ordinary campaign hat or military cap, the members of the motor command wear drab caps, which resemble closely a racing driver's helmet. Such a uniform ought to be decidedly picturesque.

The color of the motor arm is black and the guidon carried on the commanding officer's car is a drab field with the insignia of the Motor Corps Reserve in black. The

corps insignia is a spread eagle inside a motor car wheel with the letters M. C. R. appearing across the bird's breast.

Captain Ryus said today that the states might in the near future purchase motor equipment for the national guard organizations, but he pointed out that the cost of the equipment would be so great that only a small amount of motor equipment could be purchased for each regiment or corps, while an organization such as the Los Angeles corps, where the members own their own cars, will give the state and the government the same service in time of need as a national guard command as the state troops would all have to be sworn into the federal service in case of war involving the United States.

### BORDEN BATTERY FORMED

Ottawa, Jan. 23—Definite authorization was yesterday given by the minister of militia for the formation of the Borden battery for the second Canadian contingent, which has been arranged for by a number of Montreal capitalists. While the battery generally is known as the Borden battery, its official title is Motor Machine Gun Battery, to be commanded by Major E. J. Holland, V. C. According to instructions from the department at Ottawa, this battery is to be mobilized in the fourth division under Major Holland. As a matter of fact, recruiting for the battery has been going on for some time, many of the men being brought from the Conalt mining district and mobilized at the Grenadier Guards' armory here. As authorized, the unit will consist of six armored cars, armed with rapid fire machine guns, two transport cars, one machine workshop car, one motor car and six motorcycles. The force will be composed largely of skilled mechanics to handle the modern war machinery there being twenty-one artificers and twenty-three rank and file, the total strength—officers and men—being sixty. The armored cars and machine guns for this battery have not yet arrived but it is expected that they will reach here before long, when the men already got together, will start drill with the armored motors and other equipment.

### BADGER BRASS SUES GUIDE

Cleveland, O., Jan. 25—The Badger Brass Mfg. Co., Kenosha, Wis., on January 21 brought suit in the United States district court, Cleveland, against the Guide Motor Lamp Co., manufacturer of lamps and motor car accessories, charging infringement on a patent lamp socket. The complaint alleges the Guide company is using without authority the lamp socket for which Walter E. Christian was granted a patent May 27, 1912.



# Jitney Bus Causes Upset in the Transportation World

## Pacific Coast Aroused—Texas Proposes to Legislate

**S**AN FRANCISCO, Jan. 23—During the last few weeks, California has added to its long list of distinctive characteristics one which, from the rapidity of its growth has already become a pronounced factor in motoring—a factor in which the trade, the public and hundreds of car owners have become directly interested.

Enter the jitney bus.

In Pacific coast parlance a jitney is a nickel—5 cents, the twentieth part of a dollar.

"Bus" plainly indicates passenger carrying for hire.

The whole combination is terse and correctly descriptive. A jitney bus is a motor car which carries passengers at 5 cents a throw.

### Origin of the Jitney Bus

San Francisco and Los Angeles dispute the right of discovery and origin of the jitney bus. In both cities they now flourish to such an extent that almost every fourth car one sees on the main streets now carries some sort of jitney sign. San Diego has fallen into line with an enthusiastic shout. Stockton, Bakersfield, Fresno and other towns all have their jitneys now.

Exposition visitors and tourists are met at stations and ferries by large fleets of jitneys. The cars carry signs like those of a street railway, each making a specialty of a run to a certain part of the city. At the exposition cities, the jitneys feature rides to the gates from the central part of town.

Some of the jitneys are conducted as systematically as taxicab lines and with hired drivers. Far more represent merely the personal business of the owner who also officiates at the wheel. Instances are not lacking where the small boy of the family borrows dad's car and turns it at certain times into a jitney for the benefit of his own contingent expense fund.

In San Francisco, the jitney men have formed an association of 139 members, representing more than 200 jitneys and the list includes only a small proportion of the vast total. In all probability there are now a round thousand jitneys in the state, many of which are cars devoted solely to this phase of carrying.

So noteworthy an addition to the transportation facilities of a city has developed a condition which all the California cities are endeavoring to regulate in some generally acceptable way by law. Municipalities are being urged to this course by the various street car companies and by the proprietors of taxicab lines, the latter seeing financial ruin staring them in the face, as their patronage is now limited almost solely to the wealthy class of hotel trade.

City councils have discussed various

means of license and control. It is argued that, as the jitneys are becoming common carriers to a large degree, they should not be able to use the streets for which other common carriers have to secure franchise rights. The jitney men are well organized to fight any restraint which they believe unreasonable.

The jitneys have earned official recognition in the trade as large buyers of light cars and used cars of all makes. A California dealer seldom advertises bargains in used cars as such, any more, but places a card in his window denominating the cars as jitney buses. The jitneys of every California city include large numbers of heavy cars of this sort but the great majority continue to be cars of light weight and economical maintenance. Fords and Maxwells predominate, especially among the new cars of current model in jitney service.

That passengers can actually be carried for a jitney and at a profit is stoutly asserted by all the bus proprietors. A. Pastell, whose fleet of Maxwells meets the Oakland ferry line, says that careful track of his expense indicates that his car can be driven at a profit with three passengers, as an average haul. As he often carries five and charges extra for hand baggage, he is making a very good living off it, even when allowing proper provision for his time, investment and depreciation, all of which figure less than 6 six cents a mile.

Other jitney bus men who have light cars at work can show similar results. Dealers doubt, however, whether the plan can be made a success with some of the larger, heavier cars now engaged in it.

### Texas Aroused Over Jitneys

Austin, Tex., Jan. 23—The street railway interests of Texas will appeal to the legislature for relief from the terrific inroads which the so-called jitney buses are making into their earnings. It is stated that an effort will be made to secure the enactment of a law prohibiting the operation of competing lines of transportation upon streets that electric car lines already franchises. It is considered questionable whether municipal governments have authority, even under their special charters, to pass such an ordinance, and for that reason a state law covering the subject is proposed.

Some idea of the remarkable progress which the jitney motor car service has made in some of the cities of the state may be had when it is stated by an official of the Houston Electric Co. that it has reduced its earnings more than \$1,000 per day. As a result of this competition the Houston Electric Co. announces it has abandoned its plans for making improvements to the amount of \$1,000,000 to its property during the present year.

In Austin, El Paso, San Antonio and other cities the jitney buses are doing a large business hauling passengers in direct competition with the street railways. The universal charge is 5 cents per passenger, which is the same as that of the street railways. Most of the jitney cars are operated upon the same streets as the railways and they make a practice of running just ahead of a car, picking up the waiting passengers, and thus getting a big share of the business.

The proposition of requiring an annual license fee of \$100 per car of all jitney buses is under consideration in some of the towns. It is also proposed that the drivers shall be placed under heavy bond as a protection in case of accident to the passengers.

### DEATH OF MOTORING VETERAN

Philadelphia, Pa., Jan. 23—Henry Gurney Morris, 75 years old, frequently referred to as the inventor of the motor car, died this week at his home, 318 South Tenth street.

It was in 1885 that he, together with P. G. Salom, worked to perfect a self-propelled vehicle, but their efforts were not rewarded until 1895, when, in a western motor meet, they were awarded a gold medal in a contest at Chicago. This is said by many to have marked the introduction of the motor car and he was awarded the John Scott Legacy medal by the Franklin Institute for the invention.

He was a member of the Union League, the American Society of Mechanical Engineers, Engineers' Club of Philadelphia, American Institute of Mining Engineers, American Society of Civil Engineers, and the Franklin Institute of Philadelphia.

### POPE'S WEST WORKS SOLD

Hartford, Conn., Jan. 25—The announcement of the purchase of the west works of the Pope Mfg. Co. by P. Garvan, Incorporated, a local paper house is made. The Garvan interests made a flat offer of \$80,000 for the property. The property has been appraised at \$110,000 so that it is finally disposed of for approximately 73 per cent of the assessed value. This sale disposes of all the property of the Pope company in this city and under the jurisdiction of Colonel George Pope, the receiver, the main works on Capitol avenue having been sold recently to the Pratt & Whitney Co. for \$300,000. There now remains the Westfield, Mass., plant where motorcycles and bicycles are being made and which it is the intention to dispose of as a going concern. The Garvan company will convert the buildings into a paper-manufacturing plant, it was stated at the time of the sale.

# Two English Drivers Nominated for Hoosier Race

Resta and Coatalen Coming with Sunbeams—Porter-Knight Announced

NEW YORK, Jan. 27—Special telegram—Finley R. Porter, who recently founded the Finley Robertson Porter Co., to manufacture the F. R. P. car, a speed creation, announces that his company will be located in Indianapolis, Ind., where it will bring out a special small racing car under the name F. R. P., using a  $3\frac{3}{4}$  by  $6\frac{1}{8}$ -inch four-cylinder Knight motor of 207 inches piston displacement and capable of 3,500 r. p. m.

Mr. Porter states that it is the intention of the company to enter this car in practically every sanctioned contest during the coming year, starting at Indianapolis. The motor will develop, it is expected, 130 brake horsepower and the car will be capable of 105 miles per hour. Other specifications are 108-inch wheelbase; radiator pump cooling; Bosch magneto; weight about 1,900 pounds; cone clutch, four-speed selective gearset, located amidship; bevel drive, drop frame; semi-elliptic springs all around, with the rear end of the rear springs taking the drive torque rod but no radius rods; 34 by 4-inch ridge Whitworth wire wheels. The same general construction as used in the car formerly announced is followed, the same high class steel being used in the chassis.

INDIANAPOLIS, Ind., Jan. 26—Entries of D. Resta and Louis Coatalen for the 500-mile race to be run on the local speedway May 31 were announced today, a pleasant little surprise that Carl Fisher has had up his sleeve. Both men will drive English Sunbeams and they will be new cars that will be brought over by the Britons.

Neither Resta nor Coatalen has driven in this country before, but on their side of the water they are known as pilots of skill and daring. Coatalen is engineer of the Sunbeam company and the man responsible for the sensational twelve-cylinder that smashed so many world's records at Brooklands. Resta has been driving for the company for several years and is classed as one of the best, if not the best, of the English pilots.

This gives the speedway a fine start for a big entry list, for already nominated are the three Maxwells and de Palma with the German Mercedes.

So far no cabled entry has been received from Rene Thomas, but there is no doubt of his coming. His delay undoubtedly is caused by inability to close for a car, for it is said that while Delage has his grand prix cars available he wants to sell them and not loan them for racing purposes. It is said that Duray has the promise of Boillot's last grand prix Peugeot, so it is expected that last year's runner-up will be one of the early nominees.

Howard Wilcox has been added to the Stutz racing team.

## BOSCH OFFERS RACE PRIZES

New York, Jan. 25—Following its practice of encouraging drivers taking part in the big motor car contests, the Bosch Magneto Co., of New York, offers \$1,900 for the two road races to be held February 22 and 27 in connection with the Panama-Pacific international exposition. The distribution of the Bosch prizes is as follows:

To the winner of the grand prize, \$500; to the driver of the second car, \$150; to the driver of the third car, \$100. The only condition to these prizes is that the driver in each instance use a Bosch magneto for ignition purposes during the race.



ENGLISH DRIVERS ENTERED AT INDIANAPOLIS  
Left, at steering wheel, Resta; right, Coatalen

In the case of the Vanderbilt cup, the winner of the first prize receives a Bosch prize of \$300; to the driver of the second car, \$150 will be awarded; and to the driver of the third car, \$100. The condition is the same as in the grand prize race.

A second set of prizes has been arranged for the drivers in case they use during the race Bosch plugs in addition to Bosch magnetos. In each case if his ignition equipment is completely Bosch, the driver if first, second or third is to be awarded an additional \$100. Thus again the Bosch Magneto Co. will award to those drivers who are successful, an additional prize for using Bosch plugs—the six plug awards amount in all to \$600 additional.

## GLENDALE BILLS ROAD RACE

Glendale, Cal., Jan. 20—The first annual Glendale road race is scheduled to take place on the 2-mile course here, January 30. The event is being staged and managed by the local lodge of the Elks, who have guaranteed the purse and the marching club of the Glendale lodge, No. 1289, is to have charge of the details in connection with the event.

Application was made last week for a sanction from the American Automobile Association through Standish L. Mitchell, secretary of the Automobile Club of Southern California.

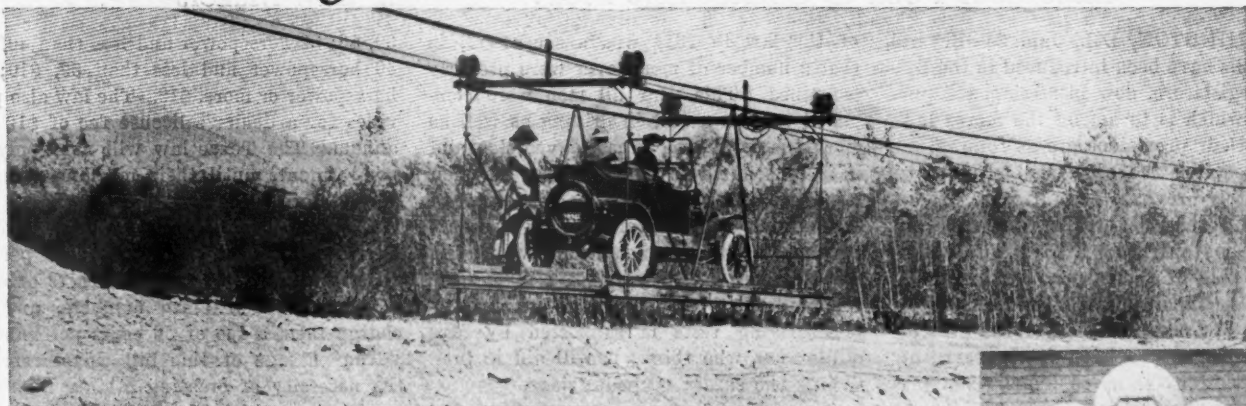
It is the intention of the local Elks to have a race that will prove one of the attractions on the Southern California speed calendar while it will in no way detract from the San Francisco and Venice classics.

The free-for-all is to be a 150-mile event and there is to be a shorter race for amateurs exclusively. A number of wealthy Elks in this section owning fast cars have signified their intentions of entering this amateur race for the Glendale amateur trophy.

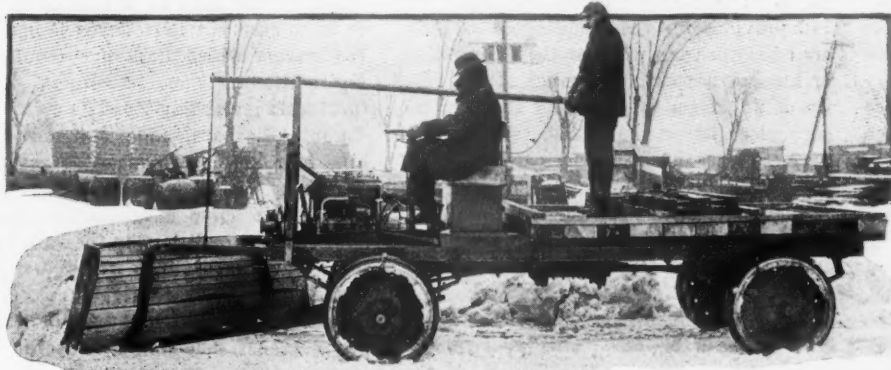
The highway commission of Riverside county has definitely decided upon the route which the county highway will follow between Banning and Palm Springs, a distance of more than 25 miles. Out of Banning the route will parallel the Southern Pacific tracks to Cabazon, 7 miles east of here, then in an almost straight line across the desert to Whitewater station, the next oasis, and on to Palm Springs on the south side of the railroad tracks.



# Through the Camera's Eye



Motorists traveling the highway between Silver City and Mogollon, N. M., enjoy the unique experience of crossing the Gila river by aerial tramway. This ferry was built by Thomas Lyon, wealthy ranch owner, to afford an outlet for his own supplies and products and to serve tourists, ore truck drivers and mail carriers who found it impossible to ford the treacherous stream at times



The Jeffery Quad, now in service in the greatest of world's war, also proved a foe of snow when recently it was equipped with a snow scoop and used to clean the streets of Kenosha

At the four principal street crossings in the center of Los Angeles, the Automobile Club of Southern California has erected elaborate and rather unusual guide posts to direct tourists to the main highways leading through or out of the city. These signs are of brass, painted green and white, and are fastened to the lamp posts



Cincinnati, in its Safety First campaign, has adopted Detroit's system of marking pedestrian lanes at the street intersections and the main highways now resemble tennis courts



An entirely distinctive craft is the watermobile, an amphibious motor car and the invention of Francis W. Taylor, of Vancouver, B. C. In place of tire-cushioned wheels, the machine is fitted with large floating hulls which, divided into compartments, skim along the water when partly submerged

# Many Motor Measures to Keep Legislatures Busy

## Indications Point to Considerable Activity Among Law-Makers

**W**ILMINGTON, Del., Jan. 23—Several bills have been introduced in the Delaware legislature, now in session, the purpose of which is to amend the motor law. Briefly, their provisions are as follows:

One requires the secretary of state to immediately revoke the license of an operator convicted for the third time in 6 months of operating a car while under the influence of liquor, magistrates being required to report all such convictions to the secretary of state. Under the present law there is no provision for a record of such convictions so as to know when the third occurs.

Requiring cars of non-resident owners of business cars regularly using the roads of the state to carry Delaware license tags. The court has held that under the present law this is not necessary except where the cars are engaged in business within the state.

Providing for motorcycle tags like those in use in Maryland, Pennsylvania and New Jersey.

Authorizing the governor to appoint a motor car inspector for each county, during certain seasons, at \$50 a month, to see that the law is complied with, the inspectors to have authority to make arrests.

Authorizing the secretary of state to use a stencil in signing motor car licenses.

### Four Bills Up in St. Louis

St. Louis, Mo., Jan. 25—Director of Streets Talbert had introduced in the city council, upper branch of the municipal assembly four bills regulating motor cars and their uses.

One measure prohibits dazzling lights and specifies the exact distance a direct ray of light is permitted to be thrown.

Another bill requires the use of mufflers and prohibits muffler cut outs.

Dense smoke, another bill says, must not be emitted from any motor vehicle.

The fourth bill seeks to eliminate unnecessary noises, providing that no horn or other noise-making apparatus shall be sounded except as a warning signal to pedestrians or to attract the attention of a traffic patrolman.

### To Improve Chauffeur Examination

Cincinnati, O., Jan. 25—A change in the present law providing for the examination and licensing of men who operate motor vehicles is favored by State Chauffeur Examiner Williamson. Mr. Williamson is opposed to examining the men every year, and says in part:

"Under the law at the present time, men are required to pass an examination yearly. This is wrong, and I have but little doubt that a change will be made by the legislature at the present session. The reason for compelling all persons to pass an examination this year was to get the law on a firm foundation, as the operation

of the law in 1914 was unsuccessful, in that a number of men never were properly examined. This year all men were compelled to pass a test in driving as well as questions pertaining to motor vehicles, and it is reasonable to suppose that the men who pass this year will be competent to drive next year. Therefore, I favor granting renewals to the men who have passed the examination this year."

The plan of compelling owners also to pass driving tests is supported by Mr. Williamson, who thinks it will aid in preserving the safety of pedestrians.

### Balk on Ohio Measure

Columbus, O., Jan. 25—Car owners and chauffeurs are planning a concerted fight against a measure which has been introduced in the Ohio general assembly. The bill provides for the licensing of all drivers of motor cars, whether they are owners or hired drivers. No member of the family of an owner is permitted to drive the car unless he or she is licensed and will have to pass an examination before the license will be issued.

Another section of the bill provides that no person under 18 years of age can drive a car on the public highways of the state.

Chauffeurs are divided into two classes, those who drive and make repairs and those who drive only. Chauffeurs of the first class are required to make an average grade of 80 and those of the second class an average grade of 60 in the chauffeurs' examination. A penalty of \$25 is provided for any person employing an unlicensed chauffeur and any person operating a car without a license is liable to a fine of \$100 and 90 days' imprisonment. A fee of \$3 is required for applicants for examination as chauffeurs.

### Texas Considering Changes

Austin, Tex., Jan. 23—A bill providing for the state registration of motor cars and motorcycles and the payment of a license fee varying with the horsepower of the motor vehicle which would bring the state a revenue of fully \$500,000 a year has been introduced in this legislature by Representative McKnight of Ellis. With the exception of one section in regard to the disposition of the fees, the McKnight measure is almost identical with the New Mexico law, which is said to have proved entirely successful in that state.

The proposed law includes all motor vehicles except traction engines, road rollers, fire wagons and engines, police patrol wagons, ambulances and vehicles run only on rails. Every owner of a motor vehicle must register his machine annually with the secretary of state, accompanied by a fee assessed as follows: For less than 12 horsepower, \$2; 12 horsepower and less than 20, \$4; 20 horsepower and less than

30, \$6; 30 horsepower and less than 40, \$8; 40 horsepower and less than 50, \$10; 50 horsepower or more, \$12. The law also provides for a dealer's license fee of \$12 per annum. The Texas law will not apply to non-residents until their machines remain in the state 60 days.

The enactment of this law would abolish the county motor tax, but would permit cities and towns to require owners of cars to register their state numbers, and to charge them a fee of 50 cents per annum.

The passage of this bill would remove the necessity of creating a state highway commission, which Mr. McKnight opposes.

Representative Holland of Harris county has introduced another bill providing for the state registration of cars which is based on the laws of a number of states. It is pointed out that Texas is one of the few states which does not require state registration.

### California Amending Road Laws

Santa Barbara, Cal., Jan. 22—Several bills have been introduced at the present session of the legislature, the purpose of which is to solve unsatisfactory road administration conditions in the various counties. One of these bills would abolish road districts and road district funds, creating one central fund, directed by a county highway engineer, who would be chosen by the county board of supervisors in conjunction with the state board of engineers. He would have sole charge of the roads, and would prepare all maps and estimates and specifications relating to them. He would examine the roads to see that they are kept in good condition and would be required to report to the supervisors at stated intervals. Bridges would be taken out of the hands of the county surveyor and placed in charge of the highway engineer.

Another bill proposes similar operation of highways with the exception that the county surveyor shall be the road engineer save in such counties that are too large for both positions. Other notions have been incorporated in bills but the important feature is that all have the desire of separating the road work from the duties of supervisor, or to be more concrete to take road work out of politics.

Santa Barbara county will in the very near future have its first experiment along the lines of road work by prisoners. A camp is now being prepared on the San Marcos pass. The able-bodied county prisoners will there be placed on their honor. The credit system will prevail. The men will be given the opportunity of work in the open and at the expiration of their term be allowed a sum in proportion to the number of days served. The camp is to be located on a flat at an elevation of about 1,500 feet which will prove central



for operations. There are to be some changes in the grade along the San Marcos pass and the entire road very much improved, although it is not the plan to make it permanent at this time.

This section is relying on the San Marcos for the main travel from the north this year, as state highway work along the coast will not be ready for several months. State Highway Commissioners Charles D. Blaney and N. D. Darlington were here last week and touched upon this phase of the situation, urging that the county agree upon the most direct route from the south to the north and make it as passable as possible. The San Marcos probably will fit into that suggestion. As the state highway will not be completed through San Luis Obispo and Monterey counties to the north, Santa Barbara county plans to co-operate so as to have a good coast road for the exposition year travel.

The situation to the south from here is now very favorable. The Casitas pass road has been in a bad way but work is nearing completion on the Rincon sea-level road and before the end of the month it will be in splendid condition, with at least 75 per cent a permanent highway. Tourists from the south will find Santa Barbara most accessible during 1915.

#### Iowa Frames Up Changes

Des Moines, Ia., Jan. 25—Proposed new laws will make several important changes in laws relating to the licensing of motor cars in Iowa if bills before the Iowa general assembly are enacted. One measure provides for the taxing of cars according to their valuation instead of according to the horsepower as at present. Under the present law the tax is the same for a cheap or a high grade car.

The legislative committee on retrenchment and reform will ask a law to provide that tags shall be good for 2 years instead of 1. It is proposed that car owners will be taxed each year but that they will not be put to the trouble of changing plates every year.

Another bill proposes that the tax be paid to the county instead of to the state treasury. Heald of Linn proposes a law which will set aside a portion of the license fee fund for state aid in road building.

The state motor vehicle department will ask two measures to prevent the payment of unreasonable fees. One will repeal the present law which requires a car owner from another state to register within 60 days even though he may have paid his tax in the other state. Under the present law the registration fee is one-half for any date after August 1 and the state department urges the adoption of a law to make the fee proportionate to the time remaining in the calendar year at the time of registration.

#### New Bill in Michigan

Lansing, Mich., Jan. 26—A motor tax bill was introduced last night in the house of representatives by Representative

Newell Smith which provides in addition to a tax of 25 cents per horsepower; also a tax of 25 cents for every 100 pounds of weight.

Before introducing his bill the representative took up the matter with the state highway commissioner and with the attorney general the former approving it and the latter stating that it was a legal measure. The new bill is in effect to replace the act of 1913 which was declared invalid by the state supreme court.

The reason for adding a tax on the weight of motor cars is because many low-powered cars are much heavier than high-powered vehicles and the latter do not wear out the roads as much as the former. Furthermore, this system also will provide a more equitable taxation and trucks and other commercial vehicles will have to pay a more just proportion, considering that they wear the roads more than the passenger cars.

#### Wisconsin to Change Road Laws

Milwaukee, Wis., Jan. 25—The Wisconsin state highway commission, which administers the state aid highway plan adopted by the 1911 Wisconsin legislature, has recognized the various demands for changes in the system made by county boards of supervisors in many parts of the state and proposes the following amendments to the law by the 1915 legislature, now in session:

Discontinue state aid for road and bridge work within the limits of cities and villages under 5,000 population.

Provide for a county highway board of three members to supervise road and bridge construction, instead of supervision by the state highway commission by means of district engineers.

Base state aid on the assessed valuation of real and personal property in each county, instead of using the amount of appropriations by townships and counties as a basis.

Return all fees collected for the registration and licensing of motor vehicles to the counties of origin instead of placing 25 per cent of the net revenue in the state highway fund and the remaining 75 per cent of net revenue in the county highway funds.

Establish a system of compulsory road dragging as part of the general highway program.

The propositions were fully concurred in by the county highway commissioners and en-

gineers attending the annual state road school held at Madison during the week of January 18. Bills embodying the ideas are now being drafted and will be presented to the legislature at once so that any delay in carrying out road building programs for 1915 may be avoided.

#### Massachusetts' Program

Boston, Mass., Jan. 23—The Massachusetts highway commission has made its annual report to the legislature, giving its ideas as to what it believes should be done in the way of new legislation. The commission has put in some bills covering its report. One of these calls for power to build roads in small towns even though an appropriation does not cover the entire cost. Another deal with giving free advice to state officials on road construction. Others aim to make more definite the meaning of chauffeur, dealer and operators. Motorcycles are to be registered differently the commission seeks the right to prevent unlicensed persons from operating machines. Licenses for operators of ambulances, fire apparatus and police patrols is also called for.

#### Missouri Amending Law

Jefferson City, Mo., Jan. 25—Senator Casey, of Kansas City, last week introduced in the upper house of the Missouri general assembly several amendments to the present motor car laws.

Among the provisions of the amendments are requirements for the muzzling of exhausts, regulating the sounding of signals in villages, towns and cities and prohibiting the erasure of numbers and manufacturer's brands from cars and accessories.

The bill also would regulate the licenses charged by municipalities, fixing the maximum that may be charged at not exceeding 50 per cent of the state registration tax.

The bill further seeks the requirement of the opening of branch registration offices in St. Louis and Kansas City for the convenience of owners in these cities, which house more than two-fifths of the states motor vehicles.

## California Promises Reciprocity

### Visiting Motorists to Get Free Tags

LOS ANGELES, Cal., Jan. 18—At a conference held here today, attended by representatives of the state motor vehicle department, the Automobile Club of Southern California and officers of the traffic division of the local police department, regulations governing motorists visiting in Southern California were drawn up.

Motorists from outside states carrying 1915 license plates on their cars will receive the same consideration as those carrying the latest California number plates, notwithstanding the price paid for the plate or in which state it was purchased.

Those visiting motorists carrying plates other than those issued in their home states for 1915 will be liable to arrest, unless they are exchanged for California plates at the southern California branch office of the

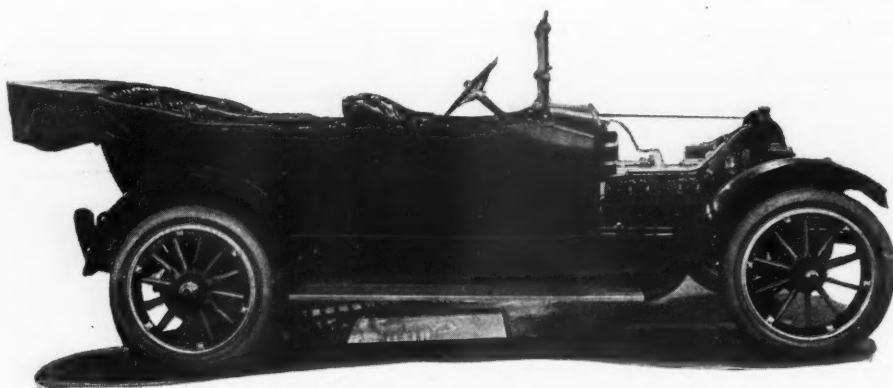
motor vehicle department of the state. Until this time motorists carrying foreign license tags have not been bothered by state, county or city authorities, but the number is increasing daily and the officials decided that some regulation was necessary.

If a motorist carrying an antique license plate called at the Los Angeles office of the state motor vehicle department and shows that he has applied for a 1915 license in his home state, the local authorities will give what is known as an exchange number, without cost, and that number will give the motorist all the privileges of the California boulevards as long as he remains in the state up to January 1, 1916.

This is an important step, which should be appreciated by motorists visiting California for the expositions this year.

# Five New Eights, 4 Sixes and 3 Fours Make Debut

## Two New Octuple-Engines Also Shown at Chicago Exhibition



COLE EIGHT-CYLINDER CAR WITH HOOD REMOVED

AS at New York so in Chicago. Eight cylinders is the feature of the new cars which make their first appearance at the Coliseum and its sister buildings. There are four new eight-cylinder cars on exhibition in addition to those which were shown at the Grand Central Palace. These are the Cole, the Ross, the Regal, and the Abbott. In addition, two new eight-cylinder motors were shown by engine makers, one of these is the Davis, and the other the Buda. Two new small sixes were on view, the Imperial at the Coliseum, and the Halladay on motor row. New fours in every case are smaller than the concern exhibiting them had previously used. The new Moline-Knight is the smallest Knight engine which has appeared in America, the Regal four is a smaller four-cylinder engine than the Regal previously has designed. Marion has a new four and six and announces an eight.

In all, there are eight new cars or new models not previously shown, to be seen either at the Coliseum or in private exhibition. The Franklin company has announced a new series whose only change in design is the inclosing of the overhead valves. In the electric field the only change within the past 2 weeks has been in the announcement of wire wheels as stock or optional equipment on practically every electric. Price reductions are announced in one instance, the Chandler price being dropped \$300, to \$1,295.

### Regal Eight on View

The Regal Motor Car Co., Detroit, is showing two new cars at the Coliseum, the complete Regal line for the coming season being three models, a new eight, a new small four, and the older four. The eight-cylinder car sells in the five-passenger touring form at \$1,250. It has a V-type motor, 2 $\frac{3}{4}$  by 4 $\frac{1}{2}$  inches and has a 112-inch wheelbase. Equipment includes, aside from the regular fittings, a one-man top with Jiffy curtains, tire carrier at the rear with an extra rim.

The eight cylinders are cast in two

### HERE'S AN EIGHT!

*You could hear it 'bove the shuffling of shoe leather on the aisles,  
It was louder than the boom and blare of band;  
You could hear it 'bove the clinking of the ten and two turnstiles  
For it seemed to be the slogan of the land.  
It was heard in ev'ry building as the critics stormed the doors,  
And it formed a common theme for tete-a-tete;  
It attracted connoisseurs from the sixes and the fours—  
The startling exclamation, "Here's an eight!"*

blocks of four each, the cylinders being of the L-head type with the valves on the inside. The outside view of the motor is made particularly clean looking by means of a removable horizontal plate connecting the two sets of cylinder heads. The plate can be removed for valve adjustment. The cylinder heads are removable, one casting covering each block of four cylinders. The electric equipment includes a Bosch-Rushmore generator on the forward left side of the engine with the cranking motor connecting to the flywheel. Ignition is obtained by battery and distributor. Above the plate connecting the two sides of the V, is the Stewart carbureter which communicates with each block of cylinders through a rams-horn intake to the integral manifold. The engine is cooled by thermo-

syphon circulation of water, there being a single outlet at the top of the radiator which branches to each block of cylinders in the form of a Y. The timing gears are chain driven.

In other respects than the motor, the car is exactly the same as the older Regal, and it is significant that the use of the eight-cylinder engine has added only 44 pounds to the total weight of the car, while the horsepower has been very considerably increased.

### Regal Small Four

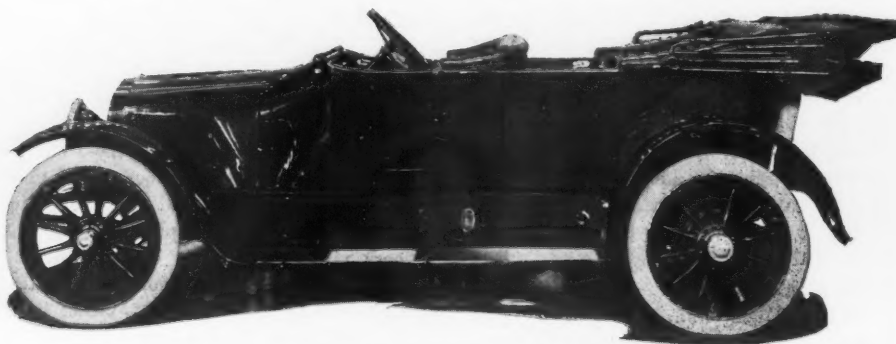
The other new Regal model is a little four having a 3 $\frac{3}{4}$  by 3 $\frac{3}{4}$ -inch engine of nominal 20 horsepower, 30 by 3 $\frac{1}{2}$ -inch tires, 106-inch wheelbase, and selling at \$650 with complete electric equipment and one-man top.

The four cylinders are a block casting and the clutch and gearset are carried as a unit with the engine. The electric equipment includes a Splitdorf-Apelco motor-generator with battery ignition. The gearset is a three-speed selective with center control. The rear axle is floating on roller bearings, and the rear springs are of the cantilever type. The wheels have demountable rims. A streamline type of body is supplied which, like the rest of the Regal models, has the radiator filler under the hood so that the smooth line from windshield to radiator is not broken. The fuel is carried in the cowl and the filler is inside the forward compartment.

Another of the new cars to make its debut at the Coliseum is the eight-cylinder Cole at \$1,785 which was described in detail in Motor Age, January 21.

### Marion Has Fours, Sixes and Eights

In the midst of all the rapid-fire announcements of eight-cylinder cars during the show, the Marion Motor Car Co., Indianapolis, Ind., has gone the other manufacturers one better by announcing not only a new eight, but a new six, and a new four. This makes the Marion line the only complete one, so far as the number of cylinders is concerned, and incidentally saves the sales force of the company the necessity of making invidious comparisons



NEW REGAL EIGHT-CYLINDER TOURIST



from this somewhat debatable viewpoint.

All three of the models are built of standard units, the eight having a V-type,  $3\frac{1}{8}$  by  $4\frac{1}{2}$  motor of the conventional eight-cylinder type, and wheelbase of 115 inches, and selling at \$1,500 either as a Bobcat roadster or five-passenger touring car. The four has a Continental block, L-head engine,  $3\frac{3}{4}$  by 5, and the same wheelbase as the eight. It sells for \$1,250. The six has a 3 by 5 block, L-head engine, a 122-inch wheelbase, and sells for \$1,350. The equipment in each case includes such fittings as one-man top, demountable rims, with one extra, and rain-vision, built-in windshield, and graphite-lubricated springs.

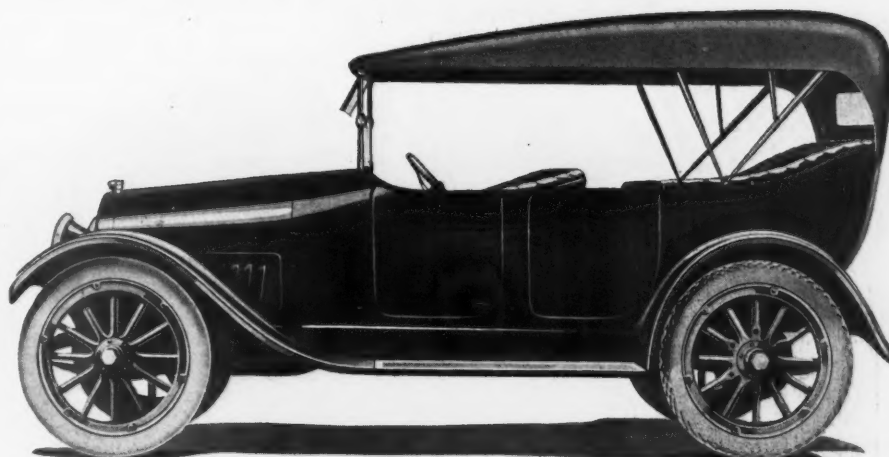
In every respect of general design, except engine and chassis length, the three cars are identical. The design includes a dry-disk clutch, and three-speed gearset in unit with the engine, Hydraulic Pressed Steel frame, Timken front and rear axles with spiral-bevel reduction, three-quarter elliptic rear springs, underslung, and the extra tire carrier anchored to the rear end of the frame members.

Motor equipment includes Bosch magneto, Gray & Davis lighting and starting, Stewart vacuum fuel feed from a tank at the rear and Fedders honeycomb radiator. The lighting system includes double-bulb headlights for city or country driving. Tires are 34 by 4. The Mutual Motors Co., which has the manufacturing of Marion cars, expects to be delivering within a few weeks.

There has been attained in this line in the body design and construction a car of smooth, pleasing lines, having a finish and trim seemingly commensurate with the price. The lines of the touring car from the hood to the windshield sweep upward in a characteristic curve, which is reminiscent of European design.

#### New Ross Eight

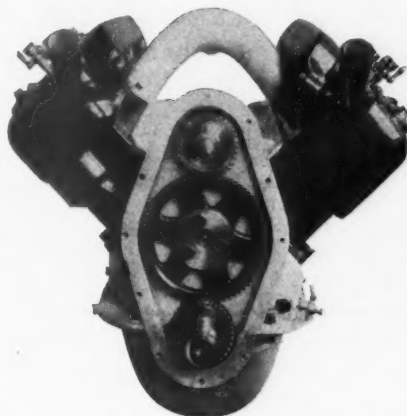
A new car makes its debut in eight-cylinder form at the La Salle hotel. This is the Ross eight, which is given the name of model A. It is the production of the Ross & Young Machine Co., Detroit, Mich., a concern which long has been making parts for Detroit car manufacturers. Aside from the eight cylinders, the feature of the car is



ROSS EIGHT-CYLINDER, SHOWING SMOOTH HOOD LINES

its price, which is \$1,350 for the five-passenger touring model, the only body offered at this time. The motor is made by the Ross & Young Co.

The eight cylinders are arranged in a V and are  $3\frac{1}{4}$  by  $4\frac{1}{2}$  inches in size. The cylinders are cast in blocks of four and are L-head in shape with the valves on the



TIMING GEARS OF BUDA EIGHT

inner side. The camshaft is driven by a silent chain and thermo-syphon cooling is used. Lubrication is by oil forced to cylinders, crank and camshaft by means of a plunger pump. Ignition is by an Atwater-Kent Unisparker having automatic advance, with both dry cells and storage batteries as a current source. Fuel is fed to the car-

bureter from a rear tank by the Stewart vacuum system.

Starting and lighting is by an electric system of Ross & Young's own manufacture. It operates on 12 volts. A multiple-disk clutch with cork inserts is used and in unit with the rest of the power plant is a three-speed selective gearset with center control.

The unit power plant thus supplied is suspended at three-points.

The drive from the propeller shaft and Timken axles is taken through the springs on the Hotchkiss principle. Brakes are 14 by  $2\frac{1}{4}$  inches in size, the service brakes being internal and the emergency brakes external of the rear wheel drum. The wheelbase is 115 inches and tires 34 by 4 on Detroit Q. D. rims. Springs are three-quarter elliptic in the rear, and the conventional semi-elliptic in front. The equipment includes the one-man top aside from the regular outfitting. A very clean streamline boat-shaped body is provided in which the line from radiator to cowl is continuous.

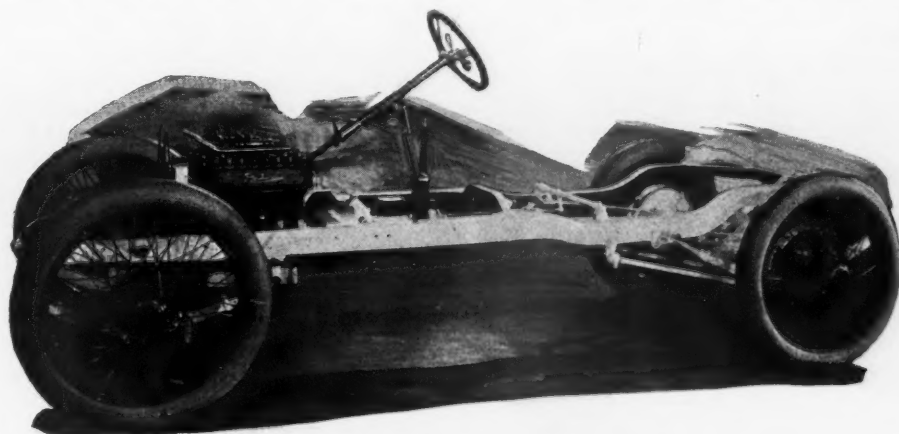
#### Franklin New Series

A new Franklin chassis makes its appearance under a new model name, Series Seven. The feature of the new series is the inclosure of the overhead valves. Aside from this, the only alteration from the car as described previously is the slight lengthening of the tonneau to give increased roominess and a general lightening of the chassis which amounts to a reduction of probably 24 pounds in the weight of the car as a whole.

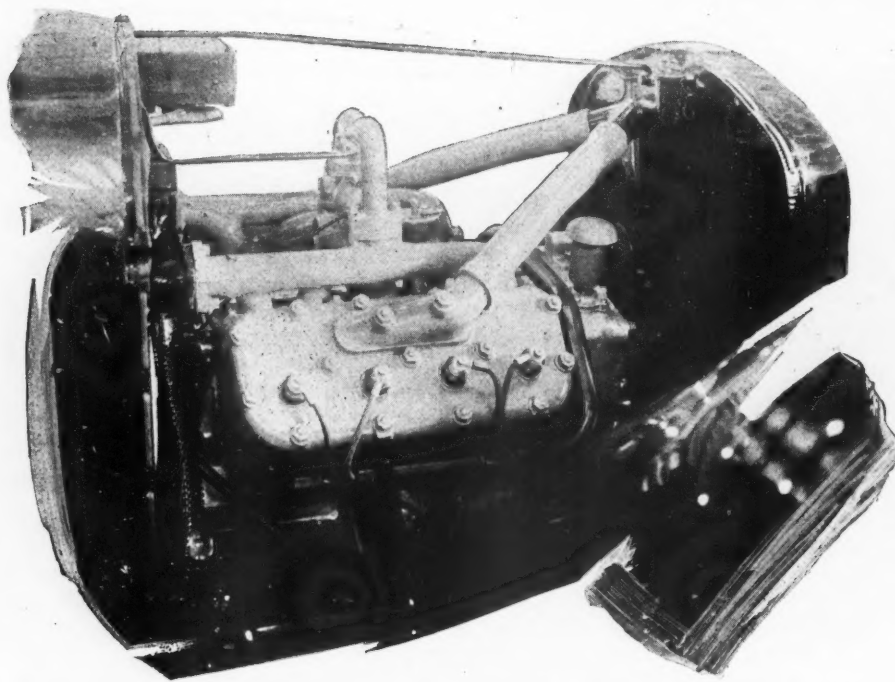
Inclosure of the valves has been accomplished by placing a metal cover over the valve operating mechanism on each of the separate cylinder heads. These covers bolt to flat bosses milled on top of the cylinder heads, and cover the valve springs and rocker arms completely, thus giving the increase in efficiency of the overhead-valve without the noisy valve operation which sometimes is characteristic of this type. The price of the Franklin car remains at its former figure.

#### New Halladay Six

Halliday cars after a period of inactivity, are again to make their appearance on the market, this time as the product of the Barley Mfg. Co., Streator, Ill. The re-ap-



CHASSIS OF NEW ABBOTT EIGHT-CYLINDER CAR



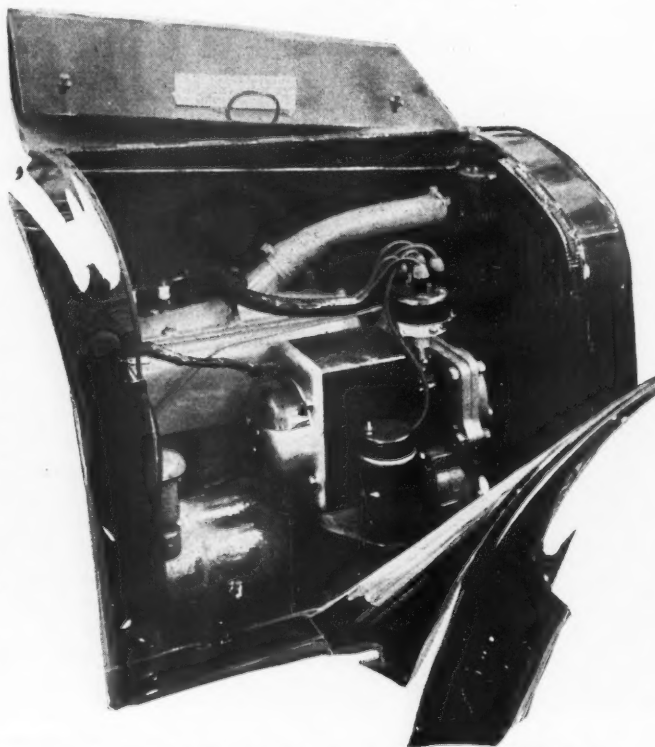
REGAL EIGHT MOTOR, SHOWING WATER MANIFOLD AND RAM'S-HORN INTAKE

pearance of the Halladay is signalized by a new six-cylinder production called the 6-40, which is to sell at \$1,385. It embraces in design a Rutenber motor of 40 horsepower capacity whose cylinders are of the L-head type, cast in block. Oiling is by a combination force feed and circulating splash, cooling by centrifugal pump circulation with a belt driven fan. The carburetor is a Stromberg with steering column air control. Ignition, in fact, all the electric equipment, is of Westinghouse make, a combined magneto and generator supplying the current for ignition and lighting, and in connection with the 6-volt, 100-ampere-hour battery, supplies the Westinghouse flywheel starting motor, which is equipped with a Bendix gear-shift. The three-speed gearset and disk clutch are in unit with the motor, the whole power plant having three-point suspension.

Gasoline is carried in a rear tank, and supplied to the carburetor by the Stewart vacuum system. Left steer and center control are stock features. A floating rear axle runs on annular ball bearings and the rear springs are three-quarter elliptic. Tires are 34 by 4 inches on Firestone or Stanweld demountable rims, and a spare tire carrier is hung at the rear. The body is of modified boat type with a smooth line from radiator to wind-shield. Individual front seats are fitted and there is an aisle way between them. With the regular equipment is included a one-man top, and an 8-day clock.

A new Imperial six-cylinder

car makes its appearance at the Coliseum. This is called the model 66, and lists at \$1,285 with electric equipment, one-man top, demountable rims and regular equipment. The motor is a Continental block casting with cylinders of the L-head type, 3 by 5 inches in size. Cooling is by centrifugal pump and lubrication is by splash system with a circulating pump. A disk clutch faced with Raybestos and a three-speed selective gearset form the unit power plant which is suspended at three points. Fuel is fed from a gasoline tank at the rear. The rear axle is a floating type on



REGAL LITTLE FOUR, SHOWING IGNITION AND STARTER

Hyatt high-duty roller bearings with a 4 to 1 reduction on high, 12-inch brakes, internal and external, are supplied on the rear hubs.

Left steering and center control is standard. The wheelbase is 122 inches, and tires are 33 by 4. The storage battery for the electric lighting and cranking system is carried under the front seat. The rear springs are three-quarter elliptic, and the body upholstery is made a special point, being designed to give maximum comfort without sagging after continued use. The car is marketed as a five-passenger tourist, body lines being of the streamline type with clean running boards, and a gentle curve from the back of the hood to the windshield. The doors are rather usually wide, and have concealed hinges and latches.

#### Ogren Six Product of Local Builder

A six-cylinder car new to the field in general is the Ogren six, which has been on the market locally in a small way for about a year. This is the product of the Ogren Motor Car Co., Chicago, and it is expected to turn out about 250 cars within the next 12 months. The car is built up from standard parts as a seven-passenger touring car, a roadster, and a limousine. The seven-passenger lists at \$2,500.

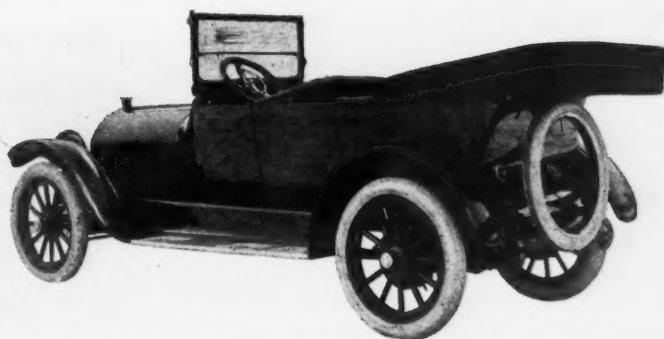
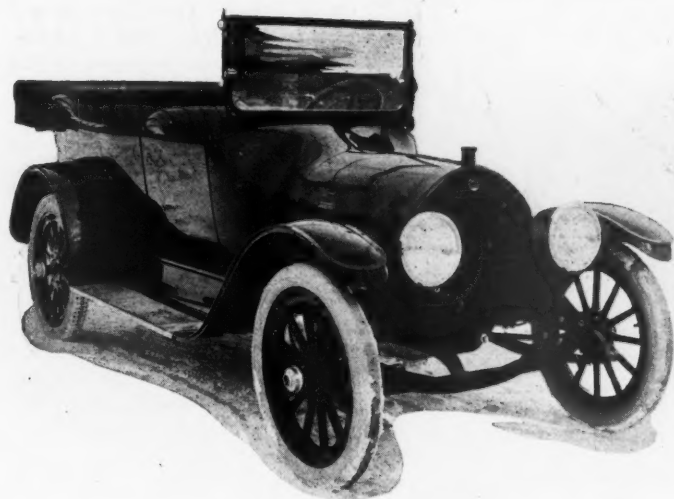
The engine is a six-cylinder  $3\frac{1}{4}$  by  $5\frac{1}{2}$ , L-head with Bosch magneto, Bosch-Rushmore cranking and lighting, Rayfield carburetor, Stewart vacuum fuel feed, Brown-Lipe three-speed gearset, left steering, center control. Timken axle and Kellogg power tire pump.

#### Shaw Special Taxicabs

Although not at the show, a new car is on display on motor row as the product of a concern which heretofore has not built cars for the general market. This is a taxicab of the Walden W. Shaw Livery Co., Chicago. As briefly mentioned in Motor Age, January 21, this concern has been building its own cars for local taxicab work for several years, but the demands from other cities for cars especially designed for this service has led it to announce that it will manufacture these cars for other livery companies. Orders from several other cities have been received and the concern states that it is in position to produce about 500 cars a year. The cars are designed for quick and easy repairs and replacement as well as for wearing qualities for the special service for which they are designed.

There are one or two outstanding features which distinguish cars for this service, as designed by the Walden Shaw company. One of these is the transmission brake, another the spiral-bevel drive, and another





TWO OF THE NEW MARION MODELS

At the left is shown the new Marion eight and at the right the new six-cylinder car

the elimination of brake equalizers, it being found that in livery service, where for safety's sake the brakes had to be looked to every day in any event, equalizers were a detriment. Easy gear shifting is made possible by a clutch brake. There is no spark advance, and a triple oiling system is provided, there being a constant level splash and force feed in addition to two plunger pumps operated by the camshaft. The pumps can be worked independently of each other, and in case both fail, sufficient lubrication for a 60-mile drive is provided in the case.

To show in what way the special design of a vehicle when used to this service has been effective in keeping down operating costs, the Shaw company reports on the maintenance of its entire equipment for a period of six months show that the labor and maintenance per cab, per day is 57 cents. The material cost is 35 cents, and the painting is 17 cents, making a total bill daily on each cab of \$1.09.

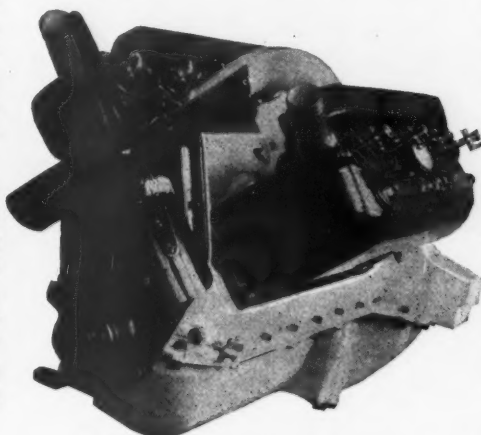
The new eight-cylinder engine of the Buda Motor Co., Harvey, Ill., which makes its first appearance at the Chicago show was described in detail in Motor Age, January 21. Photographs illustrating the features of this engine are presented on these pages.

#### Davis Eight-Cylinder Motor

One more eight-cylinder motor has made its appearance. This time the Davis Mfg. Co., Milwaukee, Wis., is the newcomer with a 3 by 4 V-type design with cylinders of 90 degrees. It has a piston displacement of 226.2 cubic inches, and an S. A. E. rating of 28.8 horsepower. It is a high-speed design, showing its greatest efficiency between 2,200 and 2,600 r. p. m. and is intended for a gear ratio of approximately of  $5\frac{1}{2}$  to 1.

There are two unconventional features of this Davis eight. First, there is use of two camshafts located side by side in the

top of the crankcase, immediately below the apex of the V. One camshaft serves for actuating the valves in one cylinder block and the other for the opposite block, the object of using two shafts being that



BUDA EIGHT-CYLINDER ENGINE

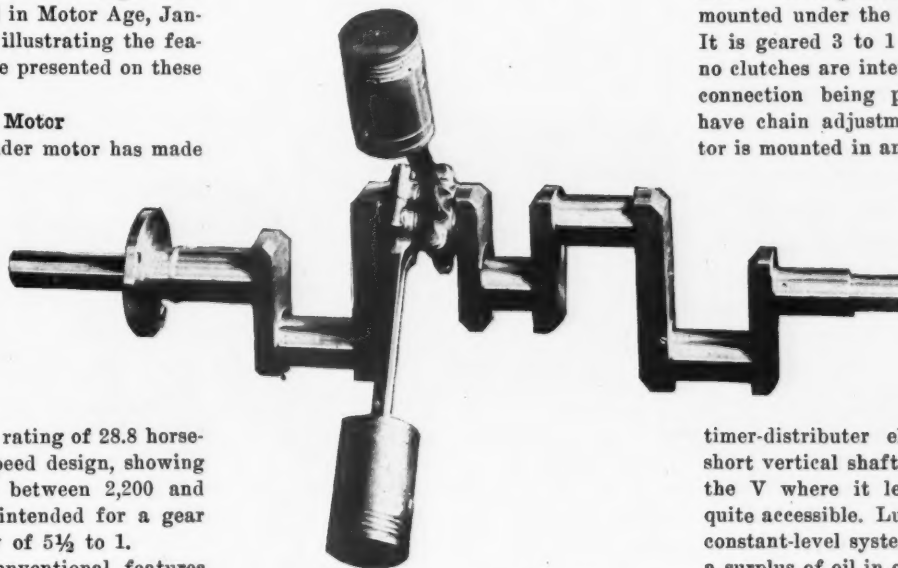
any desired timing can be had. The use of rocker arms between the cams and the tappets is eliminated, consequently correspondingly reducing the noise-possibility. The timing used is as follows: Intake opens 10 degrees late, closing 30 degrees late, and exhaust opens 45 degrees early, closing 5 degrees late. The tappets with mushroom ends bear direct on the cams and carry on their upper ends nut and lock nut for correcting the timing.

The other unconventional feature is the employment of thermo-syphon cooling for the two cylinder blocks. Water from the base of the radiator enters each block at its lowest point and well to the rear of the jacket, and the return pipes leave the highest point of the jacket at the forward end, there being individual hose connections between each cylinder block and the radiator. All valve seatings are entirely waterjacketed.

Spur-gear trains are used for driving the two camshafts as well as the ignition system, a silent chain being employed to connect the crankshaft with the Allis-Chalmers motor-generator unit which is mounted under the right front motor arm. It is geared 3 to 1 to the crankshaft and no clutches are interposed, the silent chain connection being positive. In order to have chain adjustment the motor generator is mounted in an eccentric bushing surrounding the entire cylindrical unit, and this bushing in turn is clamped into the housing in the crankcase arm.

The motor is designed for battery and coil ignition system with the

timer-distributor element mounted on a short vertical shaft in the forward part of the V where it leaves all valve springs quite accessible. Lubrication is by a splash constant-level system and to guard against a surplus of oil in one cylinder block baffle plates are inserted in the open ends of the cylinders in this block, the other block



CRANKSHAFT OF NEW BUDA EIGHT, SHOWING SIDE-BY-SIDE CONNECTING RODS

being without baffles. The carbureter is located high in the V and attaches to an upwardly-arched semi-circular type of intake manifold.

The rotating and reciprocating internal parts of the motor are generally conventional. Use is made of the yoke type connecting rod in preference to the side-by-side style. These are I-beam types, 8 inches center to center. The crankshaft, a two-bearing type, has main and journal bearings  $1\frac{3}{4}$ -inch in diameter, the front bearing being 3 inches long, the rear 4, and all crankpins are  $2\frac{1}{4}$  inches long. Valves are  $1\frac{1}{8}$  inches in diameter in the clear and  $\frac{3}{32}$ -inch lift. Each camshaft is supported on three bearings. Pistons measure  $3\frac{3}{4}$  inches in length and carry three rings close to the piston head and one oil ring immediately below the wristpin.

The motor is regularly designed to take a unit gearbox, the flywheel being completely housed for this purpose, and with the two supporting arms in the flywheel plant. A single forward support is used giving three-point suspension.

#### Moline-Knight Small Motor

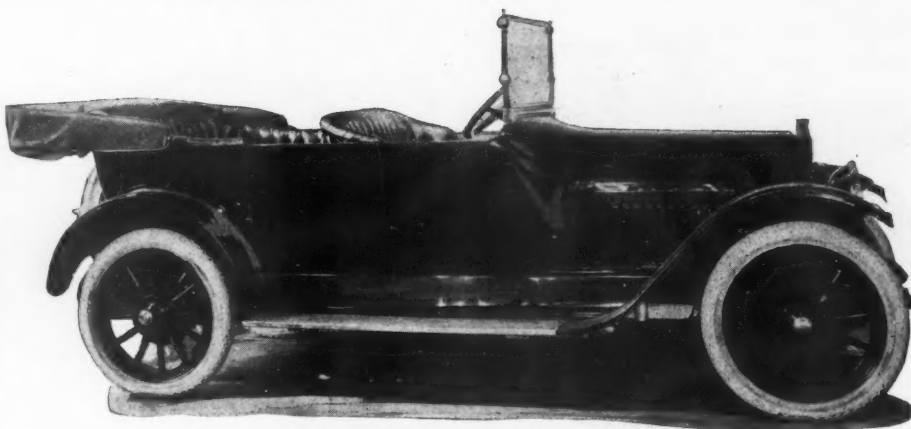
The Moline Automobile Co., Moline, Ill., is showing the motor of a smaller Moline-Knight car which is to be announced later. The motor itself is almost a replica of the larger Moline-Knight, except for its smaller dimensions. Its bore is  $3\frac{1}{2}$  inches and its stroke 5 inches, valve operation being on the Knight sleeve-valve principle. It is a block casting of particularly clean exterior appearance. Really the only distinguishing feature between this engine and the larger Knight is in the unique way in which the ignition wires are carried. These are carried up through the cylinder head, between the two middle cylinders, so that the only exposed wiring for ignition are the short leads from the central point of emergence to the spark plugs. Ignition is supplied by means of a Connecticut igniter, current for which is produced by a generator driven by a lay shaft on the timing gears. A separate cranking motor connects with gears cut on the flywheel. Another external change is the alteration of the exhaust manifold to give a more direct flow of the gas.

#### Woodward Slide-Valve Motor

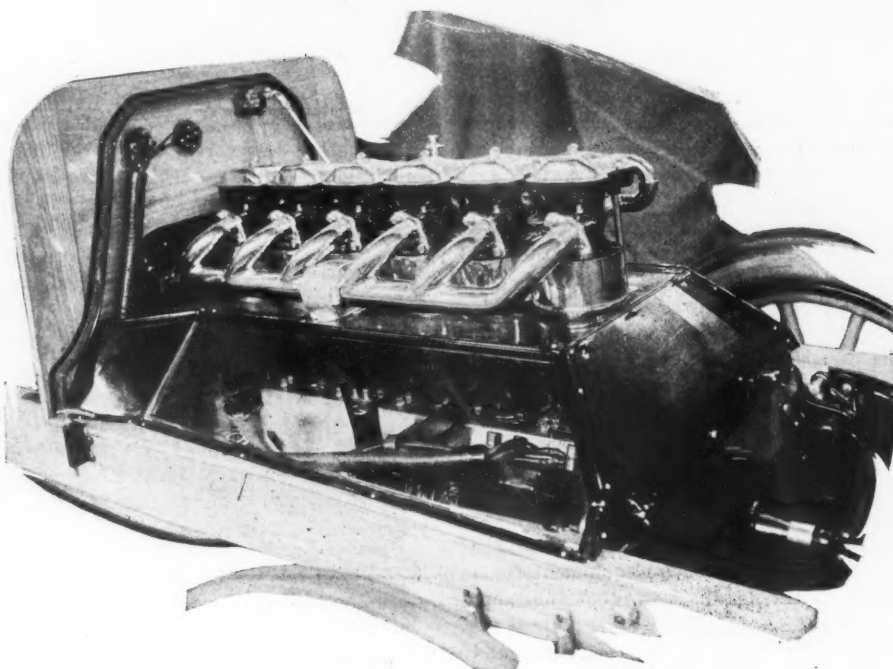
A new type of slide-valve engine is being exhibited by the Woodward Motor Co., Chicago, the engine operating on the four-cycle principle and having small semi-circular valves covering and uncovering ports in the cylinder wall. There are two valves per cylinder, one for the inlet and one for the exhaust. The valves are operated by long rods driven by a smaller crankshaft within the crankcase. The valves are positioned above the piston, the latter when on dead center almost touching them.

#### Scott Turbine Engine

This is an unusual type of motor, in which four explosions are obtained every revolution of the flywheel. It employs three crankshafts and four pistons, the latter, instead of reciprocating, revolve about the



IMPERIAL MODEL 66 IN TOURING FORM



FRANKLIN MOTOR WITH NEW VALVE INCLOSURE

extension of the crankshaft. The explosions take place in the space formed by any two pistons and thus the latter are forced

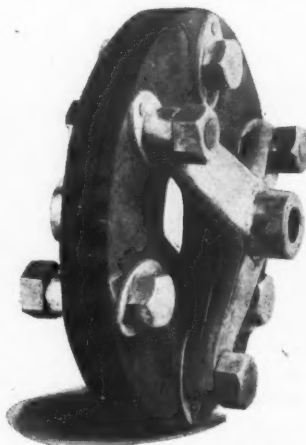
around, thereby turning the crankshaft. The claims for this motor are exceptional power for the size, silence and small space.

## Laminated Fabric To Replace Leather in Disk Universals

A NEW idea to America in car parts is exhibited at the Coliseum by the Thermoid Rubber Co., Trenton, N. J. This is a compressed fabric disk to replace the leather which is coming into use for the flexible joints which take the place of the metallic universals in shaft drives, and for flexible couplings in general. Leather universals have attained considerable prominence owing to their former use in all the Daimler cars, and in all the motor buses of the London General Omnibus Co. They have been adopted in America by

one or two concerns, one of which has employed this construction for the past 2 years.

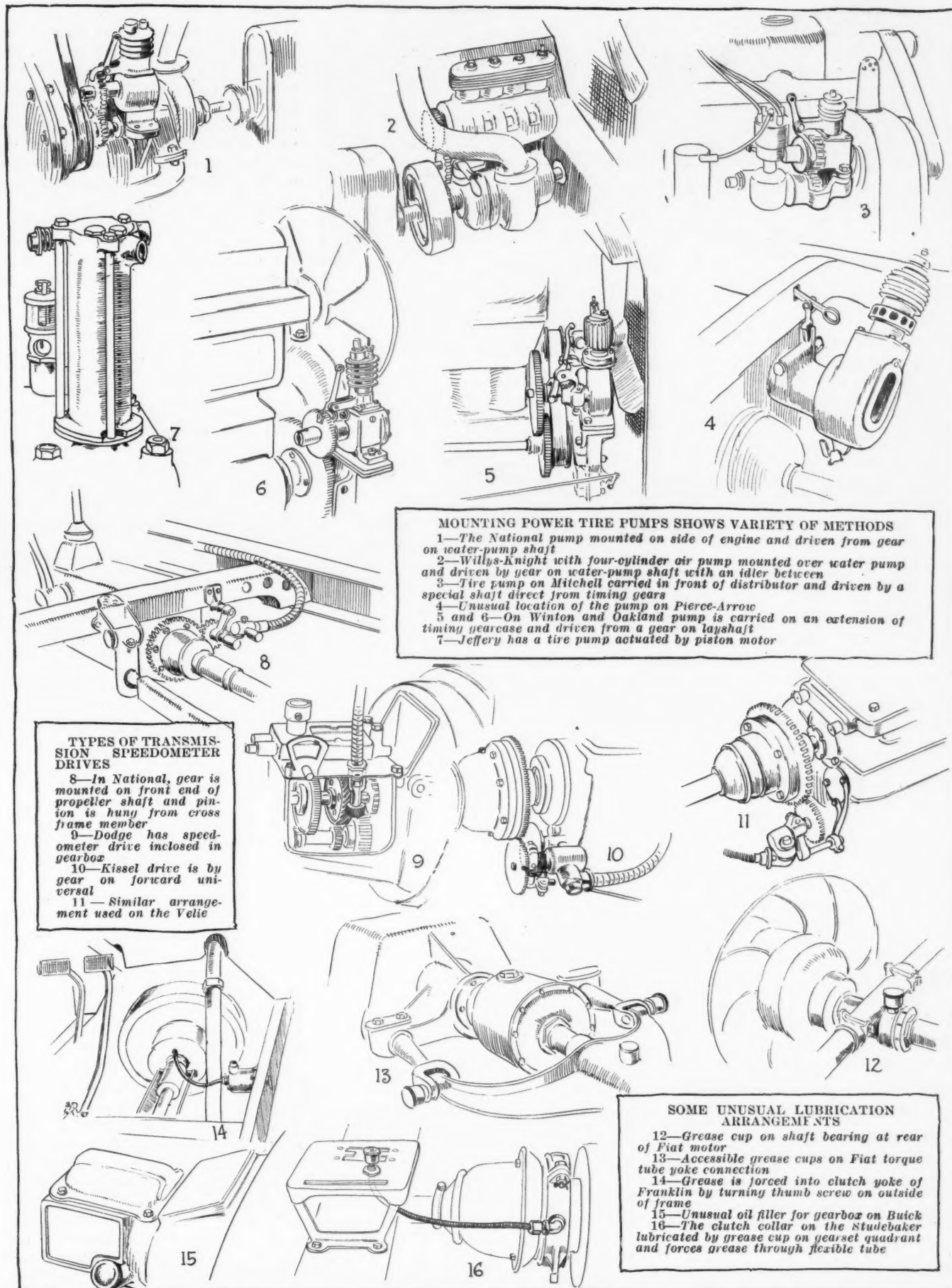
This type of flexible joint which consists of disks of leather interposed in the shaft line in place of the universal of conventional construction, possesses a number of advantages over the older type. Its chief point of advantage is in the fact that it is a continuous drive, that is, there are no parts rubbing one within the other. Consequently, friction loss is reduced to a minimum, the entire universal action being cared for by the flexing of the



THERMOID-HARDY UNIVERSAL



# Methods of Mounting Tire Pumps and Speedometer Drives



## MOUNTING POWER TIRE PUMPS SHOWS VARIETY OF METHODS

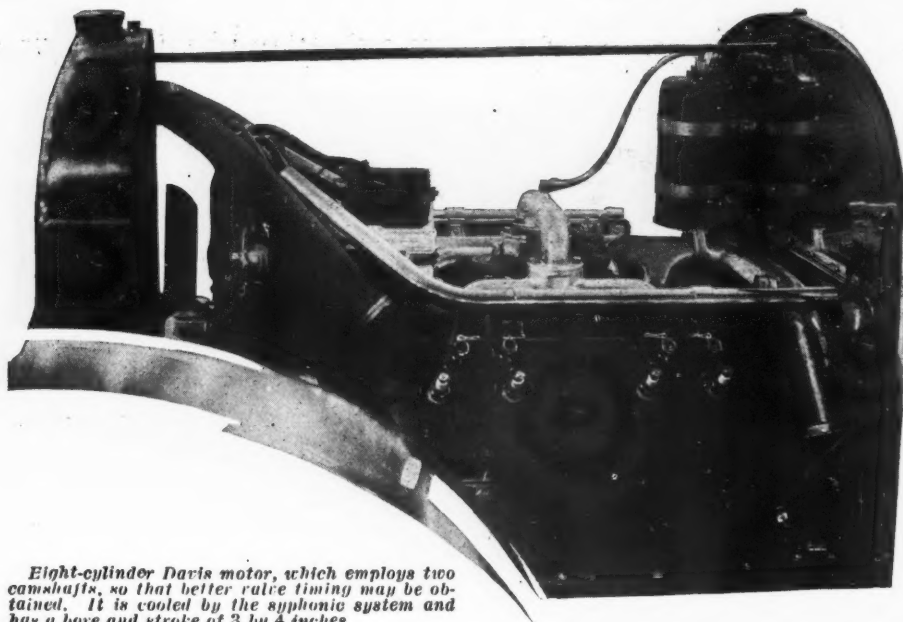
- 1—The National pump mounted on side of engine and driven from gear on water-pump shaft
- 2—Willys-Knight with four-cylinder air pump mounted over water pump and driven by gear on water-pump shaft with an idler between
- 3—Tire pump on Mitchell carried in front of distributor and driven by a special shaft direct from timing gears
- 4—Unusual location of the pump on Pierce-Arrow
- 5 and 6—On Winton and Oakland pump is carried on an extension of timing gearcase and driven from a gear on layshaft
- 7—Jeffery has a tire pump actuated by piston motor

## TYPES OF TRANSMISSION SPEEDOMETER DRIVES

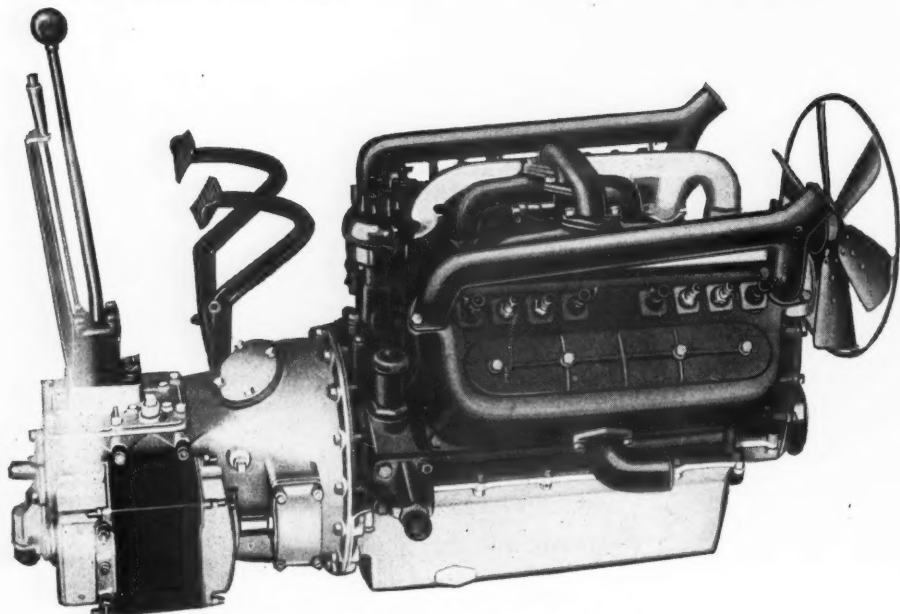
- 8—In National, gear is mounted on front end of propeller shaft and pinion is hung from cross frame member
- 9—Dodge has speedometer drive inclosed in gearbox
- 10—Kissel drive is by gear on forward universal
- 11—Similar arrangement used on the Velie

## SOME UNUSUAL LUBRICATION ARRANGEMENTS

- 12—Grease cup on shaft bearing at rear of Fiat motor
- 13—Accessible grease cups on Fiat torque tube yoke connection
- 14—Grease is forced into clutch yoke of Franklin by turning thumb screw on outside of frame
- 15—Unusual oil filler for gearbox on Buick
- 16—The clutch collar on the Studebaker lubricated by grease cup on gearset quadrant and forces grease through flexible tube



Eight-cylinder Davis motor, which employs two camshafts, so that better valve timing may be obtained. It is cooled by the syphonic system and has a bore and stroke of 3 by 4 inches



MOTOR OF NEW COLE EIGHT-CYLINDER CAR

leather between the shaft connections.

Leather, however, it is urged, sometimes is found to be open to the objections that unless it is chosen with greatest care, taken from the proper portion of the hide, which is a comparatively small area, it is likely to wear more rapidly than it should. Also the portion of hide best fitted for the purpose is that immediately over the backbone, so that in disks of any great diameter the leather cannot be uniform, it is stated.

To do away with these disadvantages which have been urged against the leather joint, Edward J. Hardy, British representative of the Thermoid Rubber Co., developed disks made up of Thermoid brake lining about 1 year ago. These were placed in service on the buses of the London General Omnibus Co., and gave such good service that this concern, together with the Daimler company, has ordered 29,000, according to Thermoid officials. The Thermoid Rubber Co. has secured the

rights to manufacture the disks on a royalty basis and has applied for American patents, as well as for patents on the complete assembly. The company made improvements over the original product by the selection of materials and its tests show that the American product is 20 per cent stronger than the leather disks.

The disks are marketed as Thermoid-Hardy universal joint laminated disks, and it is by means of the lamination of the disks, that the strength and uniformity of material is obtained. They are built up of successive sheets of Sea Island cotton fabric, and of Thermoid friction material. The sheets of fabric are laid so that the weave is at an angle with that of the sheet preceeding it, just as a deck of cards is spun. By curing and compressing, the laminations are formed into a single sheet of uniform thickness and strength.

Inasmuch as the cars of the London General Omnibus Co. have given the new universal material the dual test of efficiency in traffic service on the streets of the English metropolis and the far more strenuous test of strength and wearing qualities in their present service on the battle lines of the allies, it is to be assumed that the manufacturer's statements as to efficiency and life have been pretty well substantiated. It is stated that nine different American car concerns experimented with the new construction.

## Mounting Tire Pumps

A YEAR or so ago when the installation of power tire pumps as stock equipment first came into popularity, by far the greater proportion of the pump mountings necessarily were made on motors for which no special provision had been made. The installation in a great many cases looks like an afterthought. The new cars, however, seem to have been designed with provisions prearranged for mounting a tire pump as regular equipment. The finished job therefore is in the majority of cases a more workmanlike one.

In almost every case the tire pump has been mounted somewhere upon the motor. This is quite natural in as much as it thus is placed close to its source of energy and no complicated driving mechanism is required. In the Pierce-Arrow, however, the pump is fitted in a position remote from the engine so that it in no way interferes with the accessibility of the motor, but at the same time where it is driven without any complication of shafting. In this car the pump is located at the rear end of the gearbox and obtains its power from an extension of a gearset shaft.

Perhaps the simplest method of drive of the tire pump is found on the Jeffery, in which the power is obtained directly from the piston head. The pump is mounted at the top of the rear cylinder and the pump and piston connects directly by a rod which rests upon the piston head of the engine, so that every movement of the engine piston communicates directly to the top piston.

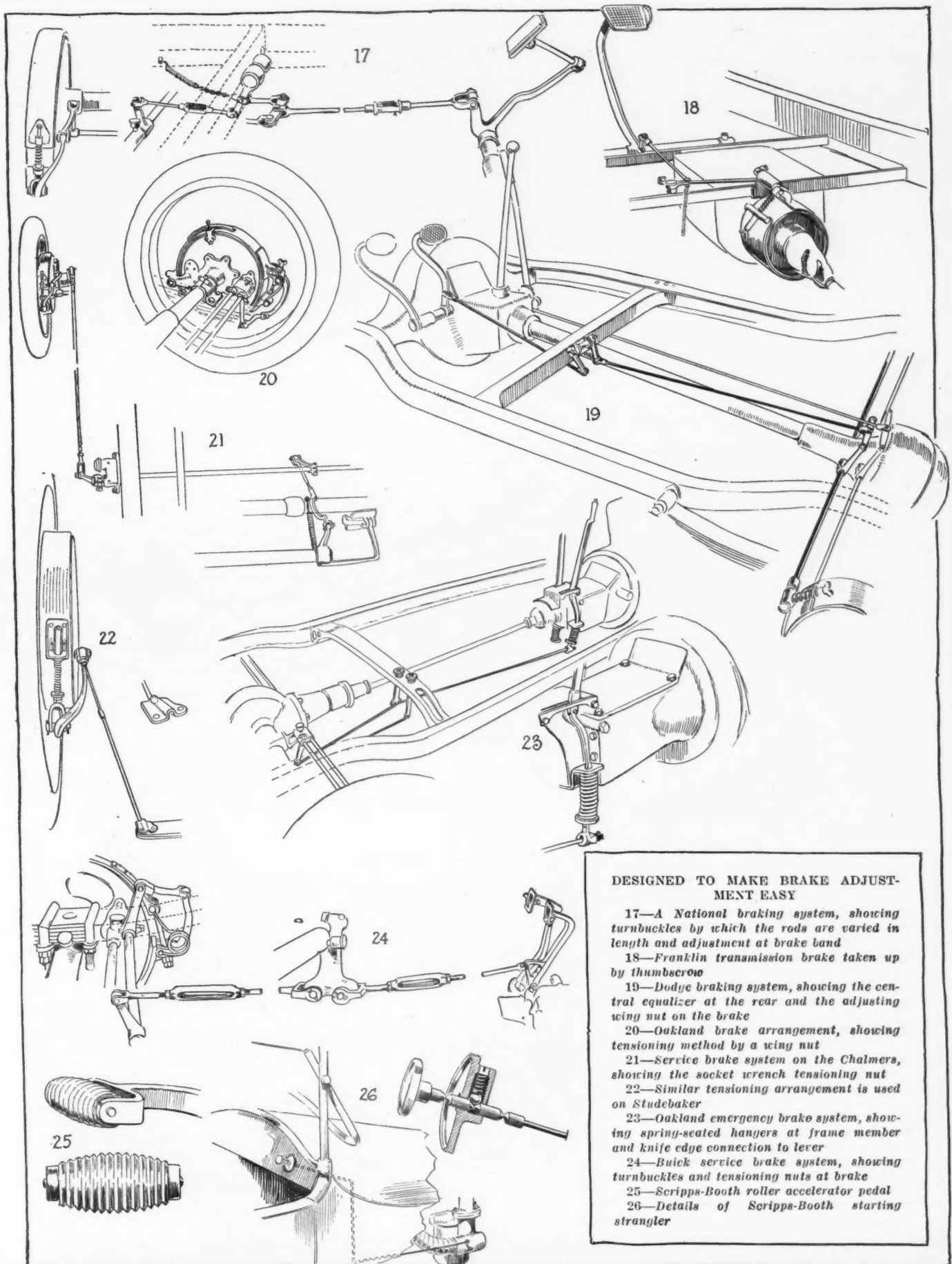
Most of the motor-driven pumps obtain their power directly through a pinion and gear and a magneto shaft or water-pump shaft. The method of mounting and therefore the method of drive is determined to a large extent by the individual arrangement of the motor.

## Speedometer Drive

THE time-honored method of driving the speedometer from one of the front wheels is losing some of its adherents. In several cases the European method of driving the speedometer from a gear on the propeller shaft or universal seems to be becoming more popular. This method has the advantage of giving a truer reading of the distance covered where there is not too much slipping of the rear wheels, as the distance covered by the forward



# Brake Adjustments and Connections Noted in Coliseum



## DESIGNED TO MAKE BRAKE ADJUSTMENT EASY

17—A National braking system, showing turnbuckles by which the rods are varied in length and adjustment at brake band

18—Franklin transmission brake taken up by thumbscrew

19—Dodge braking system, showing the central equalizer at the rear and the adjusting wing nut on the brake

20—Oakland brake arrangement, showing tensioning method by a wing nut

21—Service brake system on the Chalmers, showing the socket wrench tensioning nut

22—Similar tensioning arrangement is used on Studebaker

23—Oakland emergency brake system, showing spring-seated hangers at frame member and knife edge connection to lever

24—Buick service brake system, showing turnbuckles and tensioning nuts at brake

25—Scripps-Booth roller accelerator pedal

26—Details of Scripps-Booth starting strangler

wheels in excess of that covered by the rear wheels does not affect the reading.

The most unusual arrangement of this sort is that employed in the Dodge. Reference to the illustration on the preceding page which shows that the speedometer is inclosed in the gearbox where it is certain of lubrication and is not exposed to the action of road dirt. A chief source of wear would be due to the exposed arrangements. It will be seen that the driving gear is not an additional part but consists simply of spiral teeth cut on the outer circumference of an internal gear. The mounting of the driving pinion often is a problem in a transmission speedometer drive. The National has mounted the pinion on the cross frame member. Usually, however, this is mounted upon the gearbox as shown in the Kissel and Velie.

### Lubrication Arrangements

**T**HERE probably is no greater evidence of improvement in motor cars than in the one most important, but most overlooked feature of lubrication of the inaccessible portions of the chassis. Car makers all publish very minute and stringent directions as to daily, weekly and monthly applications of various kinds of lubricants and what seems to the owner at myriad spots. Important as the lubrication of these points is, it is neglected as a rule, particularly by the owner-driver, simply because the portions most in need of lubrication often are hidden underneath the car where they cannot be reached without a series of gymnastics and a baptism of grease and dirt.

Car makers are endeavoring to simplify this problem and insure better lubrication simply by making it easier. The clutch yoke used to be one of the neglected portions and to make sure that it is lubricated frequently, the Studebaker Corp. has placed a grease cup on the gearset quadrant, where it is in plain sight and easy to reach. A turn of the grease cup pours the grease through a flexible tube to the clutch. On the Franklin car the clutch lubricator is operated by turning a thumb nut on the frame, the lubricant being poured through a flexible tube to the clutch. Buick has placed an oil filler in a handy position at the front of the gearbox. The Fiat is particularly well supplied with grease cups, one noteworthy location being a grease cup at each end of the torque tube yoke.

### Brake Adjustments

**J**UDGING from the chassis of the 1915 cars which have been exhibited at New York and Chicago, it is evident that manufacturers have been considering with good effect the problems of the owner-driver in taking care of his car. Particularly does this seem to be true in the matter of brake adjustments—a feature which is gaining more importance in view of the Safety First propaganda, and the general betterment of roads which makes speeding more common

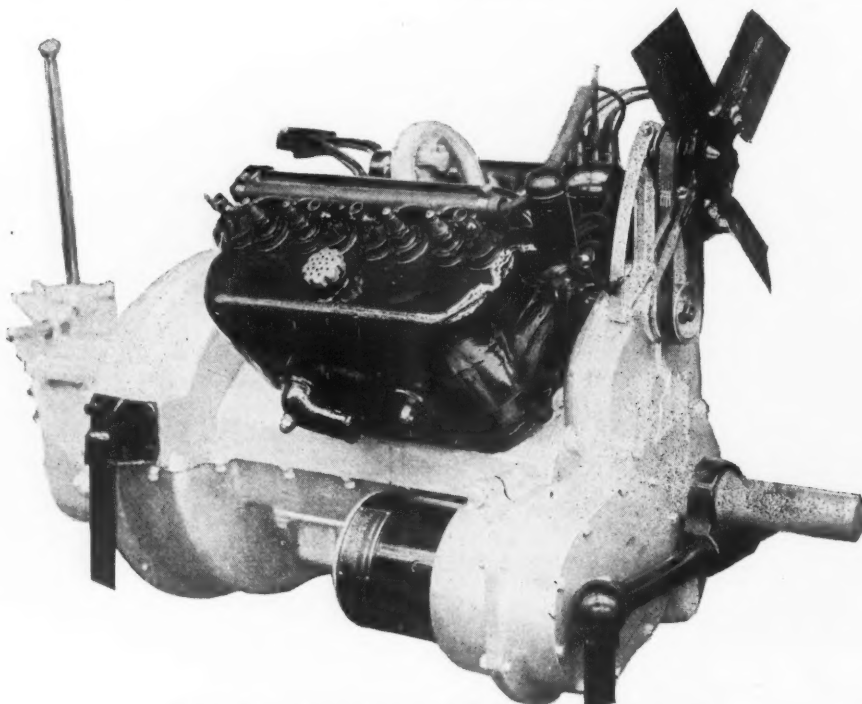
and therefore reliable brakes more necessary. On the preceding page are illustrated a number of methods designed to make brake adjustments less of a hardship. Ordinarily there are two main points of adjustment, one the alteration in the length of the rod and connections themselves between pedal and brake band so that a movement of the pedal or brake lever will produce more movement of the brake band; the other usual adjustment is that of the length of the brake band itself, which usually is obtained by means of drawing the ends of the brake bands together by a screw and nut arrangement, so that the band when released is more close to the drum than it otherwise would be.

One of the favorite methods of altering the length of the brake rods is by means of a turnbuckle interposed in the brake rods as is shown on the National and the Buick. The turnbuckle is usually arranged so that it may be twisted by a wrench or by sticking a screwdriver through it. One-half of the rod has a right-handed thread and the other half has a left-handed thread. Consequently twisting the turnbuckle draws both rods in or out of the drive. The turnbuckle is held from twisting and thus the length of the rod held constant by means of locknuts at either end. Such an arrangement generally is to be preferred to the less expensive method of having a continuous rod threaded at one end and tinned at the other, or threaded at both ends with a pinned yoke, because this requires that to alter the length of the connection it becomes necessary to remove the yoke which often is quite difficult to replace after the rod has been shortened.

Studebaker uses a brake rod which is even simpler than the one just described and has the turnbuckle's type advantage, but it does not have to be disconnected for

adjustment. In this the take-up on the brake rod is provided by having the forward end a ball and socket joint, as shown in the detail sketch 22, and the rear end is threaded; turning the rod by wrench or pliers on a flattened portion in the center threads the rear end into or out of the threaded yoke, and thus alters its length. The ball joint at the forward end permits the whole rod to turn. The length is held constant by a locknut which backs up against the yoke. The ball and socket joint at the forward end is a very simple manufacturing proposition, as connections from the end of a flat equalizing bar and it is only necessary to rivet a flat, V-shaped stamping in which the ball end of the rod fits.

Oakland cars have an unusual brake condition, in that instead of the conventional yoke and pin arrangement, a knife edge bearing is provided at the connection of pedal or lever at the rod. The idea is the same as is used in delicate scales and has the advantage that instead of loosening by wear, continued use produces only a better seat. Adjustment is provided by screwing up a wing nut on the threaded end of the rod. The rod passes through a slot in the lower end of the brake pedal or lever and through a triangular block against which the end of the lever rests. At the frame cross member the rod pivots in a flat forging which passes through the cross member and hangs loosely in it, being supported by a spring on its removable flat head. To remove the rod for adjustment it is only necessary to compress the spring slightly, give the flat head a quarter turn, and the flat vertical forging drops out, thus relieving the tension. Attention should be called here to the grease cup on the brake shafts on the Oakland, a feature which quite often is left to be served simply by an oil hole.



EIGHT-CYLINDER POWER PLANT OF THE NEW ROSS



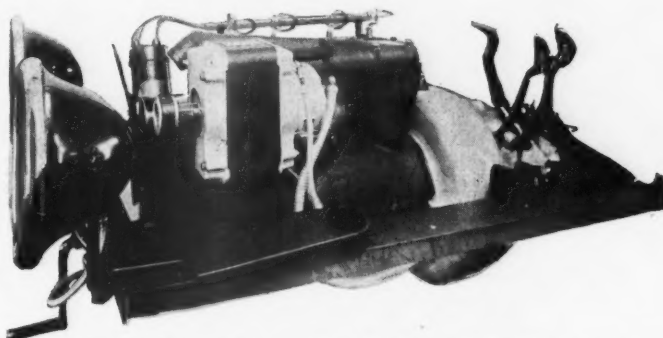
# Varied Motor Car Fitments Displayed at Chicago Show

## Many New Accessories for Ford Cars Announced

**C**HICAGO, Jan. 23—The accessory exhibit at the show can boast of not more than two dozen new devices brought out since the New York show and among the twenty-four there are perhaps only ten which are of real interest to the car owner, the others being garage necessities or manufacturers' propositions. The most attractive display offered in the accessory layout is the new Westinghouse-Ford cranking, lighting and ignition system which was kept rather quiet until show time. The new Kellogg Ford tire pump, while it was announced a week ago by the company, is being displayed for the first time.

Chicago always can be relied upon to show spring wheels, safety fenders and other accessories of this type and there are being shown such devices as a combination pump and crankhandle, a heater which uses no coal, exhaust gas or water but employs chemicals, a new shock absorber with three springs and a seating arrangement which allows of a two-passenger roadster being converted into a three-passenger.

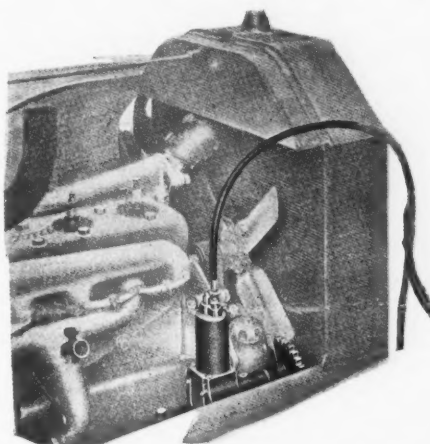
**New Westinghouse-Ford System**—The Westinghouse exhibit is featured with a new two-unit cranking, lighting and ignition system, for Ford cars, which consists of a 12-volt motor-generator, battery, and ignition distributor which contains also the interrupter and step-up coil. Externally the motor-generator differs little from the regular Westinghouse unit. It is driven by silent chain from the crankshaft and in order to allow of a means of driving the fan, the belt is fastened to a pulley on the motor-generator shaft. The cutout which is used is a separate unit. In the mounting of the motor-generator two brackets are used, one of them being attached to the cylinder head by means of special bolts and the other being attached



*The Westinghouse-Ford cranking, lighting and ignition system installed. The motor-generator is mounted on the left side of the engine and driven by silent chain from the crankshaft. The ignition device on the opposite side consists of a combination interrupter, transformer coil and distributor*

to the lower portion of the cylinder casting. The installation is shown herewith.

The ignition distributor is an entirely new affair being a combination timer, distributor and coil. It is located on the opposite side of the motor-generator, the right side, and is driven by two bevel gears from the timing case. The prices for the



*The Kellogg-Ford single tire pump installed. This pump uses poppet valves for both inlet and exhaust. It is constructed somewhat like the model 101, a single-cylinder design recently announced by the maker*

starting and lighting system are as follows: Complete, not including lamps, uninstalled, \$75; system without lamps and installed, \$85; complete with lamps, uninstalled, \$100. For the entire starting, lighting and ignition system, not including lamps and uninstalled, \$90; complete with lamps uninstalled, \$100; complete system installed with lamps, \$115.

**Vesta Batteries**—The Vesta Accumulator Co., Chicago, is displaying an entirely new line of batteries for starting and lighting service, and a new type of headlight for Ford cars. The

new batteries are made in all standard sizes and in 6, 12, 16, 18 and 24-volt form. All capacities are offered. A fair idea of the prices will be had from these: 6-volt 80-ampere hour, \$35; 12-volt 80-ampere hour, \$69.25; 24-volt 53-ampere hour, \$108.

The new Ford headlight is designed to take the place of the gas lamps furnished and for this purpose a special bracket is attached. The price is \$12 per pair.

**Dixon's Grease**—The Dixon Crucible Co., Jersey City, N. J., is showing a new form of grease for differential housings which it claims will not make its way to the brake bands. It is called No. 680 and sells for 30 cents per pound in 5-pound tins.

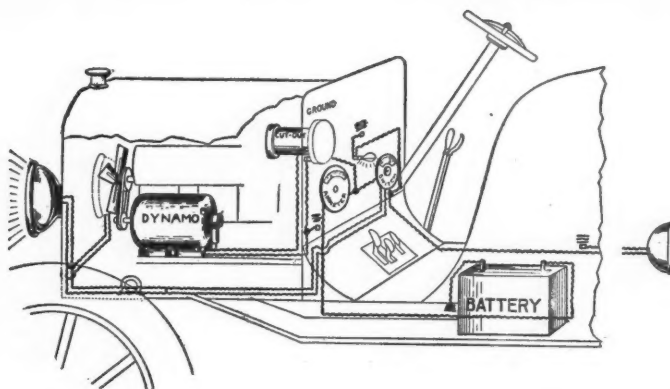
**Kellogg Pump**—Another new single cylinder pump, model 111, just brought out by the Kellogg Mfg. Co. is being shown at its booth for the first time. This new pump is for Fords and in general construction is like the one-cylinder model 101. It is an all-metal design with a poppet valve for inlet and exhaust, uses wick oiling and sells for \$9.50 complete ready for attachment. The drive is directly by gears from the front end as shown in the illustration herewith, a hand lever being used to throw the gears into mesh. It is stated the pump may be installed in 20 minutes without moving any of the essential parts of the car.

**Ajax Luncheon Outfit**—The Ajax Trunk & Sample Case Co., New York, is showing a new outfit which contains a fireless cooker and utensils for six persons. The price is \$30. Included in the furnishings are two Thermos bottles. Besides this, a complete line of such outfits is carried ranging in price from \$5 to \$60. Any one may be conveniently carried on the running board.

**Hassler Shock Absorber**—While the principle has not been changed in the new Hassler Ford shock absorber being shown by R. H. Hassler, Indianapolis, Ind., a new type of spring is employed. The older type used a flat spring with convolutions all of the same size while the



*So-Sha-Belle, a seating arrangement by means of which a two-passenger roadster can be converted into a three-passenger as shown herewith. A fourth seat can be installed if room permits. Either old or new cars can be equipped with this seating and the only changes needed are in the upholstery and seat frame*



*Bright-Ray Ford lighting outfit, which consists of a generator driven from the fan shaft, a cutout, meter, switch and battery*

new one, shown herewith, uses a spiral spring. The price has been reduced from \$25 to \$20 per set of four.

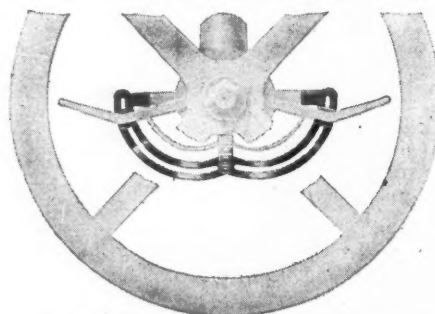
**New Solar Searchlight**—A new type of searchlight is being shown by the Badger Brass & Mfg. Co., Kenosha, Wis., the feature of it being that it may be moved vertically or laterally with a lever and locked in any desired position. The lamp used is a new parabola design with the reflector in the body with a washer between it and the glass. The casing is water and dust proof and has an outside adjustment for bulb focusing. The searchlight complete sells for \$14.75 in black and nickel.

**Radiumeter**—This is a new type of car heater which uses instead of coal, exhaust gas, etc., a special chemical compound which is contained in a polished metallic case. The case is immersed in boiling water and after removal the chemicals are said to retain heat for from 8 to 10 hours, depending upon the size of the heater. All forms and sizes are offered. The price is \$3 and when once purchased no additional material is needed, the chemicals being said to last indefinitely. The concern showing the device is the Radiumeter Co., Chicago.

**Chicago Spring Wheel**—A new type of spring wheel is being shown by Gray Bros., Chicago, this wheel employing a flexible hub with special side flanges. These flanges are fitted with slots into which the lower portion of special wedge-shaped

steel spokes, fit. The upper end of the spokes are in contact with rollers, so that when the wheel strikes a bump the spokes slide over the rollers, the movement being taken up in the hub slots.

**Ahlberg Bearing Co.**—The exhibit of the Ahlberg Bearing Co., Chicago, comprises a number of annular ball bearings which have been repaired after the races apparently were unfit for further use. This concern makes a specialty of such work claiming that a large saving can be made by both the car owner and garage-man by having the worn bearings repaired



*Pierce Quadrant, a device for attachment to the throttle quadrant on Ford cars. It allows of the throttle lever being moved any fraction of an inch instead of a fixed amount, as is the case with the Ford notched quadrant*

instead of replaced with new ones. A line of new ball bearings also is carried.

**Eureka Jack**—This is a new type shown for the first time by the Ashland Mfg. Co., Ashland, O. It is suitable for cars up to 5,000 pounds and its main feature is that it employs a steel rack bar with cut teeth, instead of the conventional malleable iron one. Another feature is the quick release attachment by which the raising bar may be lowered instantly. The control for up-and-down movement is in the form of a small lever. The handle is either of wood or metal, in the latter case a tire tool being furnished. The price is \$1.90. Another new product of this maker is the Atlas tire-saving jack, which has a price tag of \$5 for a set of four. The handle of this jack is fitted with a steel roller bearing to reduce wear and make operation easy. The greater part of the metal used is malleable iron. The top is of the swivel type.

**New Edelman Gauge**—A tire gauge with a new type of internal mechanism is

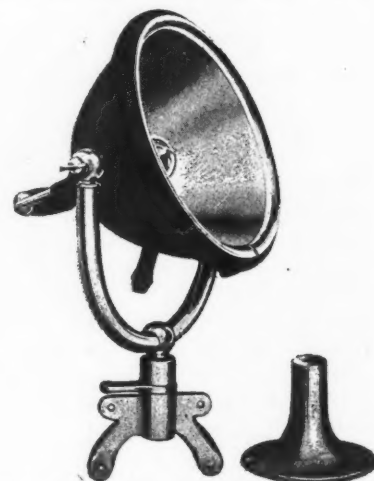
shown for the first time by E. Edelman & Co., Chicago. While it is of the pencil form it employs, instead of a rubber tube, a series of metal sleeves which telescope into one another much the same as the parts of a collapsible tumbler. The air causes these sleeves to extend themselves and thus push a cylinder upward. There is a mark on this cylinder which indicates on a spirally cut scale the pressure in the tire. The cylinder must be pushed back to zero. The price is \$1.

**Catpaw Shock Absorber**—This is an entirely new type of auxiliary spring shock absorber and is shown by the Frazer Lubricator Co., New York. As shown in the illustration herewith, the Catpaw consists of two cylinders, each containing three springs, one set upright and two smaller ones placed at an angle above it. Each spring has an individual cylinder for operation.

Aside from the three springs there is an air cushion cylinder below the large spring. It will be noted the bar B is wedge-shaped at its upper end and the sides can touch the shoes S under the two smaller springs. It is clear that any upward movement of the bar will carry with it the large spring, leaving the two smaller ones free, and in order to make the large spring return to normal slowly, the air chamber shown comes into play. Also, the downward movement of the bar causes the wedge to exert pressure against the two shoes and hence the smaller springs are compressed. The combination of the two small springs with the air chamber is said to produce excellent results in checking rebound. The price of the absorber is \$40 for cars up to 2,200 pounds.

A Ford type is shown, but it employs only one large spring, which is fitted into a cylinder open at the bottom. The Catpaw-Ford is shown herewith.

**Doehler Bearing Co.**—For the first time the Doehler Die Casting Co., Toledo, O., shows die-casting finished in brass, enamel, copper, etc., the concern having extended its line to include finishing also.

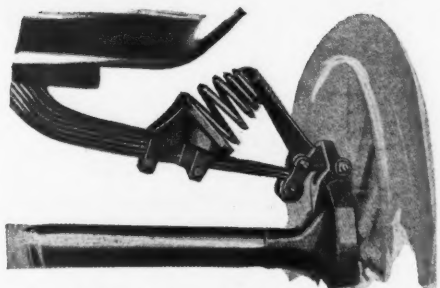


*New Solar searchlight brought out by the Badger Brass Mfg. Co. It may be moved in any position and locked. The lamp itself is a new type for this concern*



*A new lamp for Ford cars brought out by the Vestal Accumulator Co., Chicago. The lamp is designed to take the place of the gas type furnished with the car*





*New Hassler shock absorber for Ford cars. The new type employs a spiral spring instead of the regular flat type. The price has been reduced from \$25 to \$20*

A complete line of aluminum die castings are shown, the concern having gone into such production to a greater extent than heretofore.

**Pierce Quadrant**—The Pierce Speed Controller Co., Anderson, Ind., is showing something novel in the way of a Ford accessory, having at its booth what it calls the Pierce auxiliary quadrant. This is a throttle quadrant, which is fastened to the one already on the Ford car. It allows of the throttle lever being adjusted more accurately, the regular sector requiring that the lever be set into cuts in the quadrant. These cuts, the Pierce company claims, increase the speed  $\frac{1}{3}$  of a mile per hour, which often is not accurate enough for the driver. With the Pierce device the lever may be moved any fraction of an inch. The price is \$1 and it may be installed easily by any owner.

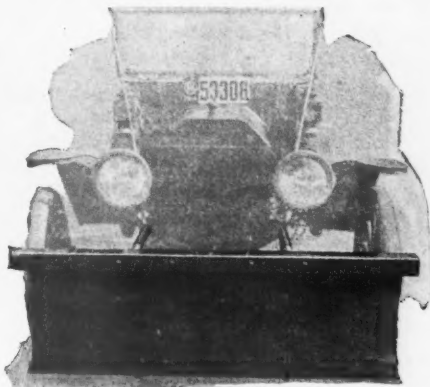
**Bright-Ray Ford Outfit**—A new Ford lighting system is being shown by the Paul G. Neihoff Co., Chicago, the outfit consisting of a generator, driven by belt from the fan shaft, a battery, cutout, ammeter, wiring, etc. The generator produces 8 amperes at 6 volts, and is driven, as shown herewith, by a belt, which is looped around a special pulley fastened to the fan shaft. The cutout is a separate unit mounted on the dash, together with an ammeter and switch. The outfit complete, including the parts mentioned, and with two headlights and tail-lights, 6-volt, 80-ampere-hour battery, wiring, bolts, etc., is \$45, and without the lamps, is \$38.50.

Two other new products shown for the first time by this concern, but marketed for about 1 year, are the Red Devil electrolytic rectifier and the Red Devil non-spillable battery, which type often is referred to as a dry storage battery.

**DeLaunty Tire Pump and Crank**—A most unusual combination accessory is being shown by the Chicago Automatic Machine Co., Chicago, the device being in the form of a unit single-cylinder tire pump and crank handle. This unit replaces the present crank on the car. The pump is contained in the portion P, in the illustration herewith, and is driven by a floating shaft within the one marked S. When the pump is to be used the nut N is pushed inward, this causing the floating shaft to be connected with the crankshaft. The

air inlet for the pump is shown at E, and the hose connection at T. The price is \$12.50, and for the Ford, \$10.

**Grau Shock Absorber**—This is a new Ford absorber on exhibition for the first

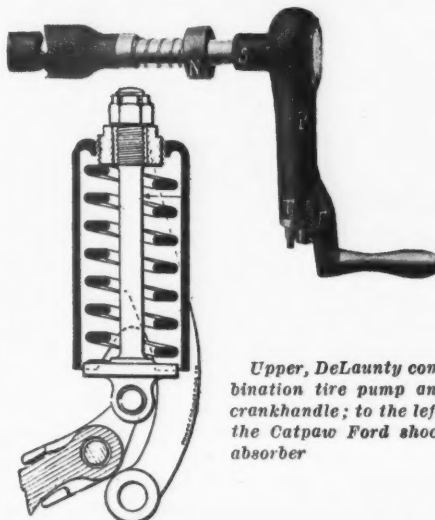


*Telescope safety fender which automatically stops the motor and drops a curtain to the ground when a person is struck. The curtain prevents the object from getting under the wheels*

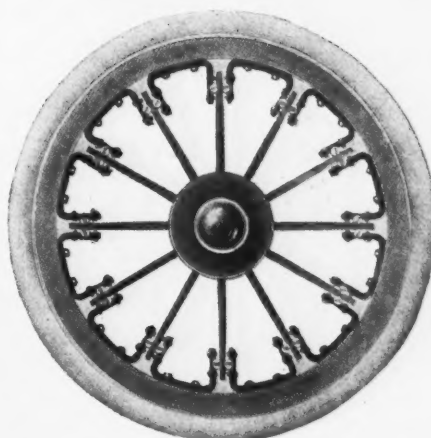
time and is shown by the Grau Shock Absorber Co., Chicago. It is a single, coil-spring type, with the mechanism exposed. It replaces the regular Ford shackles and sells for \$5 per set of four.

**Imperial Welding Outfits**—The Imperial Brass Mfg. Co., Chicago, is showing for the first time its line of oxy-acetylene welding outfits. Five types are offered, four being unmounted and one fitted to a platform truck. All come equipped with suitable torches and a number of special tips, high-pressure hose and clamps, regulators and all the accessories, such as goggles and wrenches. Besides the welding line, the concern is showing oxygen decarbonizers, pressure gauges and regulator valves for all classes of welding.

**So-Sha-Belle**—The So-Sha-Belle Co., Los Angeles, Cal., is exhibiting a seating arrangement which allows of three persons sitting in the tonneau or front compartment, where the present plan allows of only two being seated comfortably. It is an arrangement which places the seats in staggered fashion, the center one either



*Upper, DeLaunty combination tire pump and crankhandle; to the left, the Catpaw Ford shock absorber*



*Chicago spring wheel, the spokes of which are of metal, the lower portion fitting into a wedge-shaped plate in the hub. The upper end of the spoke rides on two rollers*

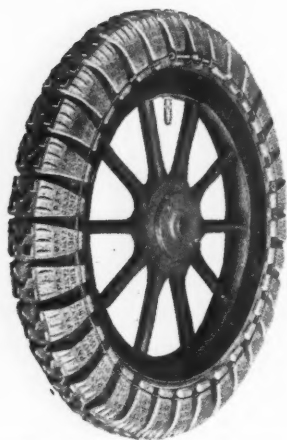
ahead or behind the two outer cushions. This seating arrangement may be used on either old or new cars, requiring changes in the upholstery and seat frame and does not interfere with the body lines. By the use of this arrangement the passengers have individual seats and arm rests, as shown herewith. It is a particularly desirable feature in two-passenger roadsters.

**Day Sectional Tread**—This is a puncture and blowout preventing device shown by the Day Sectional Casing Co., Chicago. It consists of a rubber and fabric tread made in a number of sections fastened together, so as to be slipped in place as a unit. There are spaces between each section and this, together with the rough surface of the sections, is said to prevent skidding. Prices range from \$18.75 for the 30 by 3½ to \$25.50 for the 37 by 4.

**Telescope Fender**—A new type of safety fender is being exhibited by the Telescope Fender Co., Cleveland, O., this device automatically stopping the engine and dropping a curtain to the ground, so as to prevent the person from being caught under the wheels. When a person strikes the fender the ignition is cut out, the curtain drops and the fender is pushed back, so as to prevent the person becoming seriously injured.

**Martell Aligning Reamer**—The Harding Distributing Co., Boston, Mass., is showing a garage tool for scraping motor crankshaft bearings. The device is called the Martell aligning reamer and it is claimed that with it it is possible to scrape a set of bearings in 5 hours and have the work as good as that done by hand. It is a reaming operation with the reamer accurately guided, so accurately, in fact, that the cuts are clean and void of scratches and grooves. The reamer may be set to cut to size.

**Simplex Trailer**—A four-wheel trailer for passenger cars is exhibited by the Simplex Short Turn Gear Co., Anderson, Ind. The wheels, it is stated, will follow the tracks of the rear wheels of the car to which it is attached. The trailer



Day sectional tread of punctureproof covering for the tire. The sections are all fastened together so that the tread is placed upon the tire as a unit

body is 6½ feet long and 40 inches wide. The wheels are wood with clincher rims and pneumatic tires 28 by 3 or solid, 32 by 1¼. The coupling between the trailer and the car may be detached at either end. It is stated that the trailer will reverse as well as it will go forward so that there will be little difficulty encountered on country roads.

**Motsinger Carbureter**—The 1915 model of the Motsinger carbureter made by the Motsinger Device Mfg. Co., Lafayette, Ind., is being exhibited by the concern and the only noticeable change over the previous type is the addition of a hot air pipe to the air inlet. In this carbureter, which has a single-jet, the fuel is fed in proportion to the amount of air taken in. There is a linkage between the needle valve and the air valve so that any opening of the latter will cause the proper opening of the nozzle.

**Vaco Heater**—This is a type of tonneau heater which uses exhaust gas. It is being shown by the Vesta Accumulator Co., Chicago, and consists of a register underneath which is a series of tubes for carrying exhaust gas from a point ahead of the muffler. A flexible tube carries the gas. Attachment is quite simple, requiring that a hole be cut in the floor of the car. The price is \$10, complete with all fittings ready for installation.

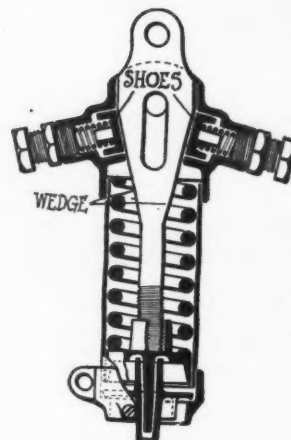
**Cuno Ford Timer**—A special timer for Ford cars is being shown by the Cuno Engineering Co., Meriden, Wis. The case is made of steel, finished in black enamel to prevent rusting. The fiber ring holding the segments is made especially hard to withstand wear. Constant lubrication is affected by splash from an oil well formed by a groove behind the fiber ring. The assembly is simple. It sells for \$2.

**Lincoln Charging Plant**—A motor-generator set and charging board for electric cars is shown by the Lincoln Electric Co., Cleveland, O., the feature of the outfit being its simplicity of construction and operation. The motor-generator is a two-bearing machine controlled by a four-pole switch located in a box. The alternating

current line is led to this box and leads from the latter, run to the machine. It is stated the Lincoln gives a tapered charge so that overcharging is eliminated. In case of failure of the line voltage, the Lincoln continues to operate, taking its current from the battery. The price is \$175.

**Hunter-Ford Starter**—A simple, mechanical cranking device for Ford cars is on exhibition at the booth of the Hunter Auto Supply Co., Chicago. This starter is operated by a handle on the dash which operates a chain. The latter controls a pawl which grips a ratchet on the motor crankshaft. The price is \$10 and the installation of the starter is not difficult, it is stated by the maker.

**Jensen Pump**—A simple, long-leverage hand pump is being shown for the first time by the W. H. Howell Co., Geneva, Ill. This device has a single cylinder, the piston of which is controlled by a lever, the lower end of which slides in a bridge. The fulcrum of the lever changes from 6½ inches from the end, at the beginning of the stroke to 3 inches at the finish thus doubling the leverage. The cylinder is made of seamless brass tubing and the piston rod of cold-rolled steel fitted with



Section through the Catpaw shock absorber showing the three springs and the wedge which operates the two small ones fitted with metal shoes

a leather cup. The price of the Jensen is \$5 and it is said to pump a 4½-inch tire to 90 pounds in a few minutes.

**Right Shock Absorber**—The Right Motor Specialties Co., Chicago, has on view the Right shock absorber which is a double-cylinder type, each cylinder containing one flat-type coil spring. The price is \$15 per set of four.

## Rubber Emissary Home from Europe

### B. G. Work Tells of Foreign Mission Results

NEW YORK, Jan. 23—The Lusitania, with 200 tons of plantation grades of crude rubber, docked in this city today. Of this amount, 100 tons are consigned to the United States Rubber Co. and 90 tons to the B. F. Goodrich Co. B. G. Work, president of the Goodrich company, returned from London on the boat.

In a report made by Mr. Work at the Union League he explained the conditions under which Great Britain lifted its embargo on rubber on January 9 and also stated that American exporters now are upon their honor strictly to observe the regulations agreed to in order that no further embarrassing trade difficulties with Great Britain may be precipitated. He also stated that in a week or so exportations amounting to \$250,000 daily will be released and 250,000 idle laborers will be enabled to return to their work. A large number of permits for shipping crude rubber have been issued by the British government, said Mr. Work. Cargoes will be allowed to go direct from here to France and Russia.

The Menominee, which set sail last week from Liverpool for this city, is bringing an additional 1,000 tons of plantation rubber, of which 350 are for the United States Rubber Co. The consignees for the balance are not obtainable here at the moment. The Franconia will be the next steamer after the Menominee on which shipments of crude rubber will be made. It is learned that the United States Rub-

ber Co. will have a shipment on that boat also.

Akron dispatches say that the officials of the rubber manufacturing companies there have announced that full forces of men will be put to work shortly and that in the near future it is expected that employment will be given to nearly all the men who are idle today. The Goodrich company states that 2,000 additional men will be put to work by April 1.

Crude rubber in Brazil shows a declining tendency, as the result of the activity of importers and manufacturers in the United States in increasing their stocks of plantation grades from London. At Manaos there are 1,000 tons and at Para, 1,100 tons available for purchase, the rubber being held. There is a light demand for this rubber.

The United States Rubber Co. has notified the trade that there will be no change in the prices of its products until March 1, unless competitive conditions or some other striking developments should make such action necessary.

### MAKING ONLY MOTOR CAR TIRES

Hartford, Conn., Jan. 25—Consistent with the policy announced recently, the Hartford Rubber Works plant of the United States Tire Co. is to manufacture pneumatic motor car tires only. The bicycle tire department has been closed down and the equipment removed to Indianapolis.



# Zenith Company Brings Out Special Carbureter for Eights

## Two Outlets for Supplying Each Cylinder Block



Latest Zenith carbureter for eight-cylinder V-type motors. Note the two outlets and the single float chamber

THAT the Zenith Carbureter Co., Detroit, is keeping abreast of the times is evidenced by its announcement of a special carbureter for eight cylinder V-type motors, which maintains all of the Zenith features and is similar in construction to the horizontal type brought out by the concern about a year ago. However, there are two outlets to intake manifolds, one for supplying each set of four cylinders, and two throttles. The latter are interconnected, so that the usual throttle lever and accelerator will act to open or close both simultaneously.

It will be seen from the illustration herewith that there are two entirely separate and distinct mixing chambers with their jets and throttles, these both being supplied from a float chamber, which, with the float mechanism, is common to both. It might be considered that each is a complete carbureter for four cylinders except that only one float chamber is used. There is also only one air intake, this supplying both mixing tubes.

The mixing chambers are horizontal, with the jets entering the venturi section at right angles. Thus, each outlet attaches to the intake connection without bend.

The main feature of the Zenith carbureter is the combining of an ordinary nozzle with one, the flow from which is independent of the suction of the engine. These two nozzles are concentric. The ordinary nozzle, or main jet, M, gets its gasoline from the float chamber through the passage C. It is surrounded by the jet J, which is supplied through the passage N from the well W. This well is open to the atmosphere and gets a measured flow of gasoline through the compensating hole D which is not subjected to the suction and therefore has a steady flow. The main jet, if used alone, would give a mixture, the rightness of which would be in proportion

to the speed, and therefore the suction. At low speeds the suction is low, and therefore the mixture would be lean. At high speeds the suction is greater, and therefore too rich a mixture would result. To compensate for this, the outer jet lends its strong support to the main nozzle at low suction, when it is most needed, and withdraws it gradually as the main nozzle gathers in strength with the increasing suction.

The slow-speed arrangement also is a feature of the Zenith construction. It is composed of the idling tube X, the lower end of which is so sloped as to receive the cone upper end of the idling tube Y. This tube Y can be screwed up into the end of X more or less by means of the knurled adjusting tube Z. This provides for adjustment of the mixture going through the tube, since air can enter at the base of tube X through holes drilled in adjusting tube Z.

The tube T connects the idling tube X with the carbureter mixing chamber near the throttle by means of the intervening passage T<sub>1</sub>. At starting, the suction at the throttle is very powerful, and fuel is drawn up from the well W through the nozzle of Y and idling tube X, at the bottom of which it mixes with air entering through the holes in the lower part of Z. The mixture is therefore atomized and sprays into the carbureter just back of the throttle and near the end of the mixing chamber. This gives a good starting mixture, and as the throttle is opened wider, the compound nozzle comes into action and the starting carbureter has no effect.

The standard Zenith features of interchangeable nozzles to fit any type of motor, metallic float with overhead float action

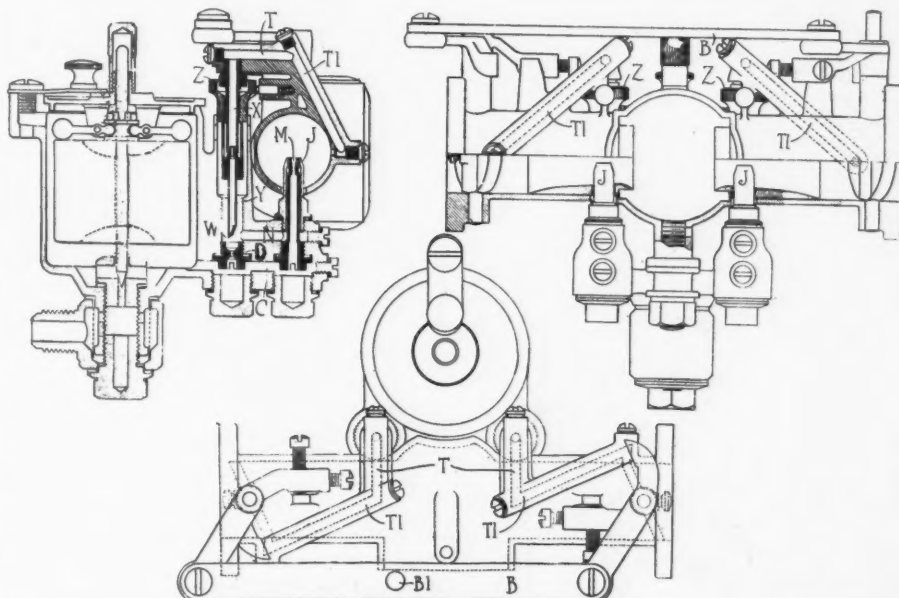
and removable venturis is retained. The common air intake is shown at A, and each of the mixing chambers opens off it on opposite sides.

The interconnection of the two throttle levers is shown at B, while the hole B<sub>1</sub> provides the means of attachment to the control rods. As the figures bring out, there are two complete sets of compound nozzles, two slow speed nozzles, and everything which has to do with the vaporization and mixing of the fuel is in duplicate so that the generation of gas will be in accord with the demands of both sets of cylinders, in the V between which the carbureter is intended to be placed.

### FEDERAL RUBBER PROSPERING

Milwaukee, Wis., Jan. 25—The Federal Rubber Mfg. Co., of Milwaukee, with factories at Cudahy, Milwaukee county, on January 20 filed an amendment to its articles of incorporation, increasing the capital stock from \$2,000,000 to \$3,000,000. The additional issue of \$1,000,000 is to be used for the accommodation of the growth of the business.

Byron C. Dowse, president of the Federal, explained that the company has under way an extension and improvement scheme involving \$500,000 or more. When this is completed, by July 1, the capacity of the tire works will be doubled. The plant at present is operating 20 hours a day and the working force numbers 1,200. It has not been found necessary during the last 8 to 12 months to lay off a single man because of depression effects. The force is gradually being increased and is expected to reach 1,600 when the latest factory addition, just put under way, is finished.

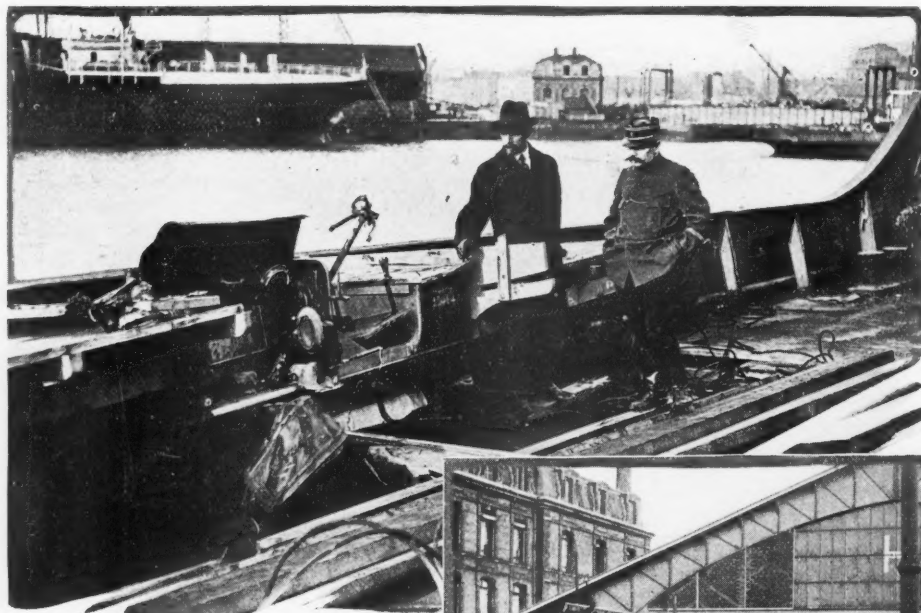


Showing sectional diagram, side and top views of the new Zenith. The lower illustration shows how the two throttle levers are controlled

# American Trucks Put Into Service by French Army

Steamer Loaded With Motor Vehicles Docks at Havre

By W. F. Bradley

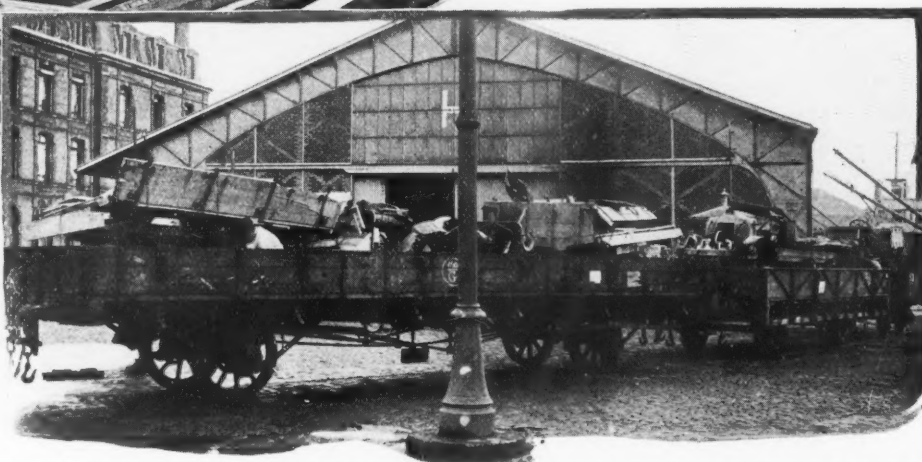


LIEUTENANT LUMET, IN UNIFORM, AND W. F. BRADLEY, MOTOR AGE CORRESPONDENT, INSPECTING WRECK OF TRUCK ON DECK OF STEAMER AT HAVRE

PARIS, Jan. 8—It needed war with all its leveling and revolutionary influences to bring American motor trucks into France and cause the Frenchman to rub his hands with delight at their arrival. The trucks are here; at the present moment they are on the docks at Havre; they are in French forts and important military motoring depots. Before this story gets across the Atlantic they will be within sound, if not within range, of the big guns; probably some of them will have fallen inevitable victims to the enemy's shells.



FRENCH SOLDIERS MAN A KELLY-SPRINGFIELD



SOME OF THE WRECKED AMERICAN TRUCKS BEING TAKEN TO THE MOTOR DEPOT BY TRAIN

There is a greater significance in this arrival of American trucks than the mere furnishing of much needed war material. It is the first time American motor trucks have run on French roads, and it is the greatest motor car order ever placed by France with the manufacturers of the United States. Although these trucks never would have gained admission in the face of a French tariff and French prejudices but for the existence of war, their arrival is important because of the opportunity afforded to dispel the latent distrust existing in the French mind against anything motoring coming across the Atlantic.

The trucks are being unshipped at Havre. Without a moment's delay they are being taken out of their cases, filled up with oil, gasoline and water, they are given a preliminary test with a military chauffeur at the wheel, they are inspected for a few hours in a local depot, then sent away, under their own power, and in convoys of about forty, to the big concentration camps at Versailles and Montlueon. From these points they are drafted to the front as the commanding officers need them.

It was after the motor car factories of France had been reorganized to produce almost exclusively for the military authorities that it was found necessary to apply to outsiders for the huge quantities of motor trucks necessary to carry to a completion this greatest of world's wars. American alone was capable of filling the order. France entrusted Lieutenant Lumet with the task of making purchases. In civil life Professor Lumet is head of the technical committee of the Automobile Club of France and chief of that institution's modern laboratory. The French envoy was one

of the few men possessing high technical knowledge without any of the prejudices almost invariably allied with trade connections.

Right here it may be stated that France has got the trucks it wanted. Honest goods have been delivered and an honest price has been paid for them. The stories of truck trash and junk do not apply to the goods delivered by the American manufacturers to the French government.

## Five Makers Supply Trucks

Business has been done with five firms. It is not claimed that the products of these firms are equal. If time had not been an important consideration the allotments might have been different, but this does not alter the fact that very satisfactory goods have been secured and the business connections established will be continued. The orders have gone to White, Packard, Pierce-Arrow, Kelly-Springfield, and Jeffery. There are intermediaries on the French market offering other makes of trucks to the armies, but up to the present they have not succeeded in doing any business with the French government.

When I attempted to get on the dock at



Havre the sentinel placed his bayonet in a threatening attitude, the sergeant authoritatively asked for passes, the officer declared that it was absolutely forbidden to take a picture, then exclaimed, "Come this way; there is something which ought to interest you." We scrambled aboard the American transport and on the metal decks of that vessel was a sight which would have made a motor car lover weep. When it left New York this vessel carried 220 trucks, forty of which were on deck. Of those forty there are twenty which can only be described as junk. They were solidly boxed when they left the home factory, and before the boat went out of port the boxes were firmly lashed down. But such heavy seas were shipped that the cases were stove in, the wood went overboard and with the slack in the ropes, consequent on the absence of the packing, the trucks lashed about on the deck until fenders were crumpled, frames cracked, axles and wheels had gone overboard, and steering wheels were represented by a few spokes.

#### Pierce Trucks Stand Trip Well

Although no firm has escaped, Whites have suffered most severely, owing to the fact that they were in a majority among the deck cargo. To place motor cars on deck for a mid-winter crossing was a mistake for which the shippers are evidently responsible. Generally, the packing was satisfactory, although the  $\frac{1}{2}$ -inch planking used by some firms might, with advantage, have been replaced by the inch boards used by the Pierce company. Out of the 166 Pierce trucks received at the time of my visit, only one showed any damage. Aboard with the motor cars were hundreds of tons of barbed wire intended for other purposes than keeping cattle within bounds. This cargo shifted somewhat and helped to break in some of the cases.

By reason of these conditions the engi-

neers sent to France by the different companies had a much more elaborate job than they had supposed on leaving home. The Packard company has two men, John L. Green and Fred. d'La Barre; Pierce has I. G. Williams and E. Selman; White has W. H. Margon, E. W. Bassett, E. M. Shields, and two men from England, and the Kelly-Springfield company had sent two representatives. No Jeffery trucks were being received at the time of my visit, although some were at work in town.

#### Crates Converted Into Shelters

As fast as the steam cranes deposited the cases on the muddy docks, by the side of which fresh troops from England alternated with wounded just brought in by boat from Belgium, they were attacked by soldiers armed with crowbars and laid bare with rapidity if with a prodigality of labor. If no damage had been incurred during shipment, the trucks were withdrawn and sent away within an hour, the body of each one being filled up with the wood which 60 minutes before had acted as a protective covering. They valued that wood. Armed sentinels watched it day and night; when it was unloaded at the motor car depot it was made use of to construct sheds for French or Belgian troops.

A considerable amount of delicate work had to be done in drying out magneto armatures and coils, getting the rust out of distributors and the brine out of carburetor jets. This work was carried out in a shack where a dozen Americans took liberties with the French tongue and French soldiers gloried in the possession of six words of the American language.

From the docks the trucks went either singly or in groups of three or four to a big military garage in town. Each day a convoy of twenty or thirty trucks left the garage for a 25-mile tryout, this trip serving to initiate the drivers as well as assure



JEFFERY TRUCK WITH SOLDIERS IN CHARGE

the correct working of the machines. Instead of coming back to the garage the convoy went to a neighboring fort, from which they were dispatched at regular intervals to the big concentration depots. The American engineers had to accompany the trucks on this preliminary trial. Their work was completed when they left the vehicles in charge of the officers at the fort.

#### Many Drivers Inexperienced

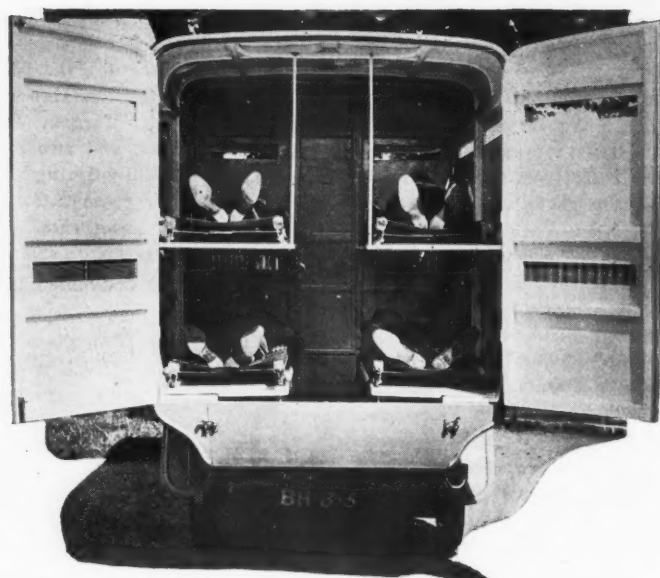
As nobody in France, whether civilian or military, can drive a motor car until he has submitted to a practical examination and secured a proficiency certificate, it might be expected that the American trucks would get into good hands. Some of the drivers know their business and can be relied upon to get the best out of the trucks for the greatest length of time. There are others whom one would blush to describe as green. It may be thought that I am romancing, but the fact can be vouched for that one man ignored the use



R. N. GOODE, OF PACKARD COMPANY, AND ONE OF HIS TRUCKS ON THE HAVRE DOCKS



WILLIAMS, OF THE PIERCE-ARROW, WITH TRUCK, READY TO BE HANDED OVER TO FRENCH ARMY



LATEST TYPE OF MOTOR AMBULANCE USED BY ENGLISH ARMY

Above are illustrations showing a special motor ambulance body, mounted on an English Wolseley chassis, made from photographs sent to *Motor Age* by R. A. Rothermel, who represents American manufacturers of parts and accessories in England. Mr. Rothermel declares that this type of body seems to have given the best satisfaction to date, as it will hold four wounded on stretchers, or two wounded on stretchers and six sitting, or twelve sitting; there is a door in front so the attendant looks after the wounded while the car is in motion. Mr. Rothermel adds that he thinks that it would pay American manufacturers to design similar bodies, as he believes there will be a chance to sell complete ambulances in large quantities in the spring.

of the clutch; the brakes were all he needed, and when he had stalled the motor going down hill he got out and cranked it. Another, as a preliminary to starting, injected 15 gunfuls of gasoline into the cylinder—when the fuel was running out of the exhaust pipe he cursed the machine. Another said “camion Americain, no good” because the motor would not start without the switch being put in. A Packard engineer was asked to diagnose the case of a truck which could not keep up with the rest. The driver was not aware that there were more than two gears.

These facts should be borne in mind when reports come home, as they probably will, that the trucks are giving trouble. The military authorities have made the mistake of supposing that every man holding a driving license is capable of driving. Men who, years ago, managed to take a motor car round the block, under the eyes of an inspector, and never have handled a steering wheel since, boldly come forth with their pink tickets, while skilled motor mechanics, who know all that is to be known about cars, but who have not applied for the official piece of paper, are left in the line regiments. This defect is so serious that it is surprising the French military authorities have not yet become alive to it. Officers in the motor corps are aware of its existence, but they have no power to remedy matters.

#### Packard Seeks Packard Drivers

Arrangements are being completed by the Paris branch of the Packard company whereby all Packard drivers now serving in the French army shall be transferred to Packard trucks. This transfer cannot be made by the men themselves, who, in most

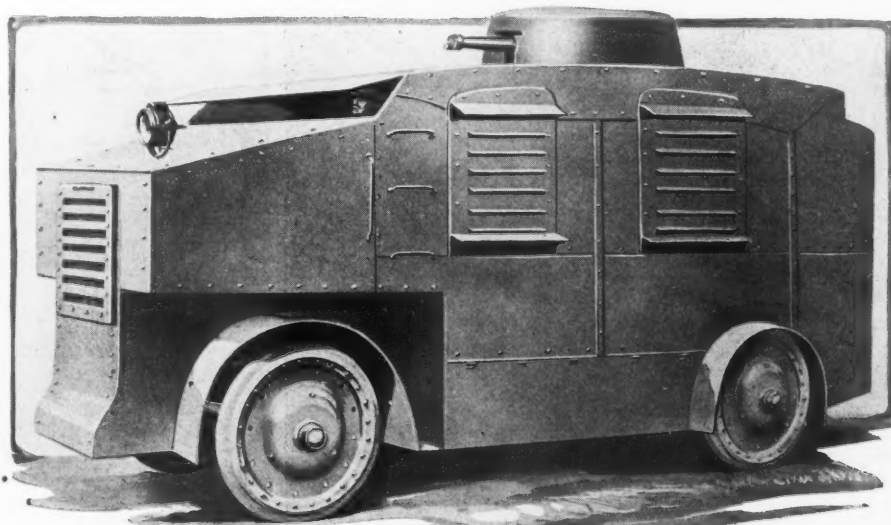
cases, are ignorant of the fact that American trucks are working in France. Although the number of men obtainable in this way will not be sufficient for all the Packard trucks ordered by the army, it nevertheless will form an expert team whose influence will be felt.

#### French Truck Purchases Total 2,000

The actual number of trucks bought direct by the French government is practically 2,000, more than half of which already have been delivered. Judging from the regular manner in which deliveries are now being made, the first order will be completed by the end of January. Only 2 and 3-ton models have been bought by the French. The English have placed or-

ders for 4 and 5-ton models, among them being 150 Packards; Pierce-Arrow also has orders for this type, and for armored cars to be used on the battle line.

It is rather surprising that the English should continue to buy 4 and 5-ton types in view of the greater experience of the French that for continental conditions the smaller type is preferable. With each order for complete trucks, purchase is made of a number of knockdown chassis. This gives all necessary components as motors, gearboxes, axles, etc., to replace the wastage of war. In addition to this, the Pierce company has, on its own initiative, consigned a large number of all the smaller spare parts to France and will supply them.



AN AMERICAN ARMORED CAR

This is the Jeffery Quad equipped with an armored body and which the Thomas B. Jeffery Co., Kenosha, Wis., is to exhibit at the Panama-Pacific exposition in San Francisco next month.



as required. This move appears to be highly appreciated by the authorities and I understand that an endeavor is being made to induce other manufacturers to follow the example.

Absolute adherence to French army motor car standards were not insisted on when contracts were placed. Lieutenant Lumet picked out the models which most closely approached French standards and accepted them without change. As the order is a big one and the trucks will operate in fleets, the difference in size of bolts

and nuts, magneto platforms and couplings, etc., is not really important.

All tires are American size. It has been decided to retain these, and when tire renewals become necessary, it is probable that American-size tires will be continued. These can be obtained in France from the Goodrich company's factory.

The equipment of the trucks is a feature which has called forth special commendation. The Pierce tool and spare parts box, the top of which forms a work bench, is a good feature. This firm supplies detailed

instruction books printed in French. On the dash of the Packard trucks there is a detailed instruction plate, also in French. Most of the trucks have towing hooks front and rear, but they do not all possess radiator guards. More accommodation might have been provided for the driver's personal effects, and greater protection should have been given against the weather. This latter is a defect common to most of the French trucks, and is one which only has been revealed by war under winter conditions.

## New Models Announced by American Truck Makers

### Federal, Locomobile, Packard, Mack, International

#### FEDERAL

THE Federal Motor Truck Co., Detroit, Mich., has entered the worm-drive field with a new Federal 1½-ton truck which has the Timken-David Brown worm-driven axle. The chain-driven models are continued and with the exception of the final drive, the newer model has the same general design, as has characterized the chain-driven cars of this name. The worm-driven model has been put through several months of testing in order to determine the ability of the trucks to stand up under hard, continuous service.

Capacity of the chassis is given as 3,000 pounds, and the chassis weight is 4,000 pounds. The motor is a four-cylinder, block, L-head engine of 4½ by 5¼ inches. The crankshaft is extra heavy and is carried by three babbitt bearings. Ignition is provided by waterproof, high-tension Eisemann magneto with fixed spark. The carburetor is a Stromberg and the throttle control is by accelerator pedal only, the speed limits being set by a centrifugal governor, which holds the maximum engine speed to 1,190 r.p.m. This gives a maximum speed of 15 miles per hour with the 8.5 to 1 gear ratio.

Motor lubrication is provided by the constant-level splash system, which has been incorporated with Federal design for many years. The radiator is arranged for quick repairs in that the core is separate from the body of the radiator with separate top and bottom tanks bolted to it. In addition to easy demounting, this provides a very substantial construction.

The clutch is a pressed steel, leather-faced cone, 16 inches in diameter. The forward end of the clutch shaft is carried by a self-lubricating bushing when free and six auxiliary springs underneath the leather allow easy operation. It has been designed to do away with any thrust or wear on the rollers except when the clutch is actually held out.

Mounted on a cross member of the frame amidships and coupled to the clutch by a short shaft with universals is the three-speed selective gearset. Gears and shafts are of nickel steel running on high duty roller bearings. Final drive is by a double

universal propeller shaft to the worm-gear rear axle. This propeller shaft is of tubular section to avoid any possibility of whipping.

The worm is mounted with the differential as a unit, this housing forming the top cover of a massive axle casting. The axle is a floating, and the outer ends of the shafts have drivings flanges which bolt direct to the hub flanges.

Emergency brakes are internal on rear wheel drums. The service brake is mounted on the gearset and is of the contracting type on a 10-inch drum. Raybestos friction services are used and the brake mechanism made very easily adjustable by means of worm gears connecting the operating lever with the toggle lever. Rear springs are semi-elliptic and are designed to be nearly flat when under load. The spring seats are integral with the axle casing. Driving and braking torque is taken by the springs, but sturdy radius rods of I-beam section connect the axle casing directly to the frame side member to maintain proper distance and alignment.

#### LOCOMOBILE

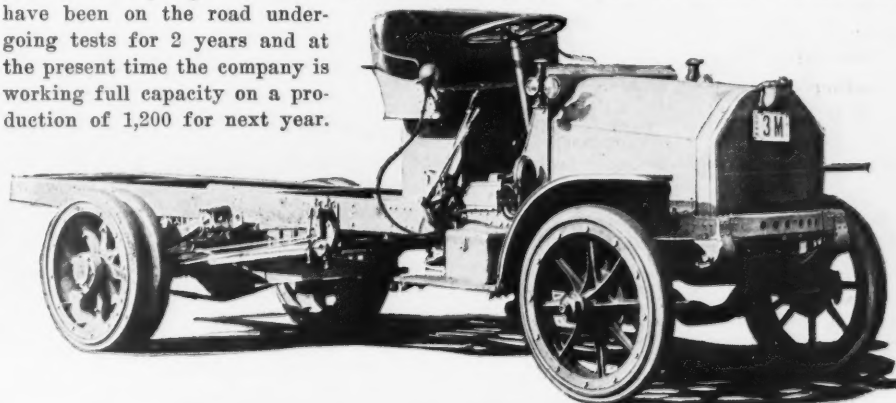
THE Locomobile Co., Bridgeport, Conn., has added to its line of chain-driven trucks two new models 3-ton, and 4-ton size, both worm-driven types, these models marking the entry of this company into the worm-drive field. These models are alike in practically every respect excepting that in the 4-ton heavier rear tires and heavier rear springs are used. The trucks have been on the road undergoing tests for 2 years and at the present time the company is working full capacity on a production of 1,200 for next year.

The first lot of 500 is going through the factory, and by March 1, it is estimated, that production will be thirty to thirty-five vehicles a week.

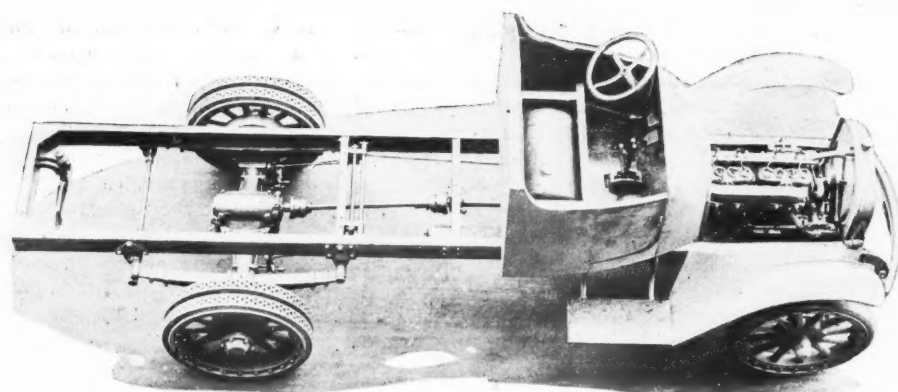
These new worm-driven types differ from the previous 5 and 6-ton chain-driven ones in that the worm-drive models have the motor under a hood with the driver's seat in rear, as compared with the motor being located under the seat in the larger chain-driven types. Throughout the new models, the same grade of material is used as employed in the Locomobile passenger cars, nickel and chrome-nickel steel finding places in many parts, including alloy steel springs. Both models use a four-cylinder motor 4¼x6, and drive through a four-speed gearset.

The new worm-axle design has a housing made up of a steel casting covering the differential, worm and worm wheel, and into this are inserted nickel-steel tubes forming the axle tubes. These nickel-steel tubes are then enclosed in cast-steel sleeves, forced on and bolted at the inner end to the cast-steel housing. To these sleeves are secured the spring seats, brake parts and distance rods. The worm is mounted above the wheel and is a quadruple, straight-thread type. Two reductions are given, one 8¼ to 1, the other 10 to 1, and the engine governor is set so that using the 8¼ to 1 ratio the truck speed is 14 miles per hour.

Both trucks are made in two wheelbase lengths, 150 and 186 inches. On the 3-ton



NEW LOCOMOBILE 3 AND 4-TON WORM-DRIVE TRUCK



MACK'S NEW 2-TON WORM-DRIVE TRUCK

model, tires are 36 by 5 with rear dual. On the 4-ton the fronts are 36 by 5 and the rears, 36 by 6 dual. The gear ratio on the 4-ton is the same as on the 3. A pressed-steel frame construction is used throughout; Timken bearings are used in the front wheels, and in the differential, annular ball bearings are used with Timkens in the rear wheels.

### PACKARD

**D**ETAILS of the recently announced series of Packard worm-drive trucks, ranging in capacity from 1 to 6 tons, are at hand. There are six models in the series, the ratings being in even tons in each case. The 1-ton model is new to Packard commercial construction, as it is the first light truck the company has ever marketed.

Equipped with four-cylinder block engines, these cars have a form of the unique centralized control which has featured Packard passenger cars of later design. It is used in conjunction with left drive and left gearshift and brake levers. Mounted directly in front of the steering column, this control board has on it the controls for the carburetor and the electric system. On the upper surface of the board are three levers working in saw-tooth sectors. These control the auxiliary air supply for the carburetor, the spark timing and the throttle. On the left side of the control board is carried the spark coil and its switch, metal conduits inclosing all wiring. The control assembly is not attached to the steering column, but rather has a separate supporting column of its own within which the various control rods run to their objective points under the hood.

Another conspicuous feature of the new trucks is the worm drive and its construction. The worm is mounted over the wheel and is a straight type of steel, while the worm wheel is a special gear bronze. The worm is mounted as a unit in a special steel carrier, which is bolted in place in the center housing of the axle. Due to this construction, quick removal of the worm, worm wheel and differential is possible. This feature and the floating axle design make it unnecessary to disturb the road wheels or to take the axle from under the truck.

The new Packard final drive is incorporated in a built-up rear axle with the weight of the truck carried on heavy steel tubes, which are pressed hydraulically into a rigid central housing. The lower part of the axle housing forms an oil reservoir and the worm, running in the oil thus contained, draws it up to the contact surfaces, affording constant lubrication for worm and wheel and thrust bearings.

Tubular radius rods remove the driving strains from the springs, while a steel torque arm hinged to the front of the worm housing and supported at its front end by a tubular cross member provides for the torque.

A special feature is the provision made for equipping a power take-off so that the power of the truck motor may be utilized to drive external machinery. Electric lighting and cranking has been made optional with the purchaser. The Packard-Bijur system, with separate motor and generator, is supplied at an additional cost of \$225 over the list price. This equipment weighs, complete, 150 pounds, with battery.

The radiator is flexibly supported on the frame side members by springs which protect it from road shocks. The mounting being independent of the hood, frame weaving does not strain the unit. It is a cellular type and fitted with a Motometer, which indicates the cooling water temperature, and serves as a danger signal when the motor gets too warm.

Although all six units of the new Packard series are of similar general design, complete details of the 1-ton and the two heaviest models are not yet forthcoming. They will not differ from the 2, 3 and 4-ton types except in dimensions and certain other details made necessary by their differences in capacity. While the specifications and general design as here brought out apply specially to the three intermediate models, they may be regarded as representative of the whole line. Only the prices of the 2, 3 and 4-ton models are given out now, these being \$2,800, \$3,400 and \$3,800, respectively, without electric equipment.

Motors are L-head and are placed in forward hoods ahead of the driver's seat. The 2-ton has 4 by 5½-inch engine rated by the S. A. E. formula at 25.6 horsepower,

and the 3 and 4-ton models use a 4½ by 5½-inch size, which is rated at 32.4 horsepower.

They are alike in every respect, and are carried in the frame by a three-point suspension. An arched cross-piece at the front affords a member from which the center of the front of the crankcase hangs, while at the rear a yoke piece, which bolts between the flywheel and clutch housings, gives a support at either side rail. This makes it easier to remove the motor unit. By taking off the radiator and the intervening motor connections the entire unit may be displaced without hoisting.

The carburetor, water pump and governor are placed on the left side, while the valves and the magneto and exhaust header are carried on the left. Thus the fuel goes through cored passages in the cylinder casting to the intake ports, aiding vaporization. The carburetor is a characteristic Packard type improved in design. The air intakes are equipped with shut-offs to facilitate cold weather starting. In addition to hot-water-jacketing, the unit is protected from mud and water. The intake pipe curves to the rear so that these foreign elements are not so apt to enter it.

Lubrication is simple. A gear pump in the lower part of the crankcase, driven from the camshaft by a spiral gear, supplies oil under pressure to all motor bearings. The pistons and cylinder walls are lubricated by overflow from the piston pin bearings and by spray from the lower connecting-rod bearings. The helical front gears are oiled by the overflow from an oil screen and by a by-pass at the front of the engine.

An automatic governor provides for an option of speed varying with the model. A lever on the control board operates the automatically-controlled throttle within the speed previously determined by the truck owner. The entire mechanism is inclosed and sealed against tampering by the truck driver. The governor is a centrifugal type, and in the 3 and 4-ton models limits the maximum motor speed to 1,000 r.p.m., which corresponds to a speed of about 12 miles per hour with the standard axle.

The trucks use the Packard form of dry-plate clutch, which is housed in unit with the motor. The gearset, which adheres to the progressive principle of gear changes that has featured all cars of this make, is a separate unit and is supported at three points by pressed-steel cross members. It is located about amidships of the chassis. Back of it, there is a propeller shaft of double universal type carrying the power back to the axle.

Springs are half-elliptic front and rear, and there are two sets of brakes. The service brakes are contracting shoes on a drum on the propeller shaft just back of the gearbox. The emergency brakes expand internally on the rear wheel drums. The wheels are of the usual wooden type, and have single solid front tires with dual



solids in the rear. The 2-ton specifications call for 34 by 4 tires all around; the 3-ton uses 36 by 5; and the 4-ton requires 36 by 5 fronts with 40 by 5 rears.

In the matter of wheelbase, there are options of either a standard length or a long dimension. The 2-ton therefore may be had with either 12 feet or 14 feet wheelbase, and the 3 and 4-ton models come with 13 feet or 15½ feet wheelbase.

### MACK

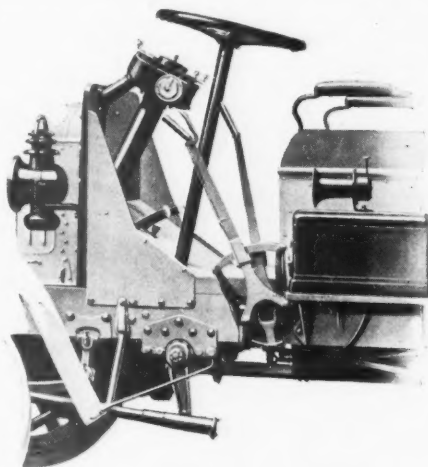
TWO worm-driven models have been added to the Mack line of the International Motor Co., New York. One is of 1-ton capacity, and the other of 2-ton. The two models are alike in almost every respect except in carrying capacity, wheelbase, wheel sizes, and other details which would be necessitated by the difference in carrying capacity.

The power plant of both the 1-ton and 2-ton models is the same. This is a four-cylinder engine, with 4 by 5-inch L-head cylinders cast in pairs. The aluminum crankcase is removable without disturbing the main bearings. In fact, the accessibility to the working parts of the motor through the crankcase is such that connecting rods and pistons can be taken out of the motor on the road and the truck run in on three cylinders if necessary. The crankshaft is 3 inches in diameter. The engine has been designed for the least possible number of gears. There are only three in the timing gear train, one crankshaft gear, a camshaft gear, and the magneto shaft and pump-shaft gear. The teeth of the gears are cut at an angle of 45 degrees, making for silence and diminishing wear. The water pump is driven from its spiral gear by a leather universal coupling. The Bosch magneto likewise is driven through leather universals.

With the camshaft gear is mounted a governor of the centrifugal type which operates a butterfly throttle valve. The governor is sealed so that it cannot be tampered with by the driver. Lubrication is a

combination of gravity and splash. The oiling to the three main crankshaft bearings and the front gears is accomplished by feeding oil from the reservoir of the front cylinder, which in turn is fed by a gear pump in the lower part of the crankcase. The other parts are oiled by splash in the ordinary way.

The inlet manifold has the double function of leading the gas from the carburetor to the cylinder and the water from the pump to the cylinders. This simplifies the exterior and keeps the manifold warm. In unit with the motor is a dry-plate clutch and three-speed selective gearset, giving a unit power plant which has three-point suspension. In making the power plant a unit, an instrument board is mounted on the rear



The illustration shows the centralized control of the new Packard truck design, in conjunction with left drive and left side levers. The controls for the motor, carburetor and electrical system are centralized on the control board, mounted directly in front of the steering column. On top of the control board are three levers working in saw-tooth sectors. These levers control the auxiliary air supply for the carburetor, the spark timing and the throttle. On the left side of the control board is mounted the spark coil, all wiring being enclosed in metal conduits. The accelerator pedal is conveniently located in the toe board, at the right of the foot brake pedal.

cylinder and arranged so that it is in direct view of the driver through a hole in the dash. It carries the oil pressure gauge, ignition switch, carburetor adjustment, and speedometer. This makes the chassis entirely independent of the body as there are no connections, either electrical or pipe-fitting, to be made in changing bodies.

The governor permits a speed of 16 miles per hour on the 2-ton truck, and 18.4 miles per hour on the 1-ton. The final drive is through a worm-gear axle of the David Brown type, the axle is floating, and the drive is taken through springs. The wheelbase on the 1-ton chassis is either 132 or 144 inches, giving it a turning radius of 22 or 25 feet. Including the metal seat, sliding door, and equipment, the 1-ton chassis sells for \$2,000. Tires are 4 by 36 solid in front, and 36 by 3½ dual in the rear, or 36 by 6 single.

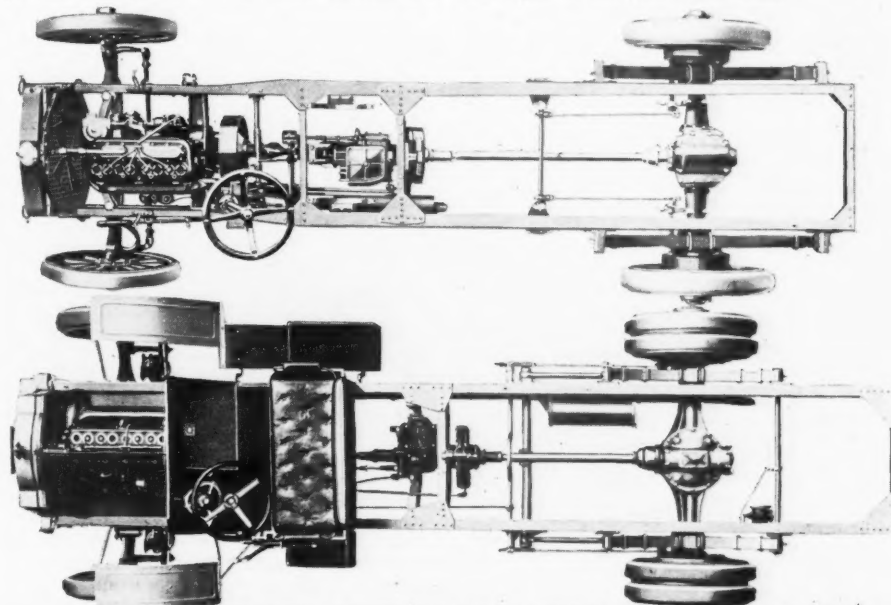
On the 2-ton chassis the wheels are 36 by 4 inches in front and 36 by 4 dual in the rear. Two wheelbases are offered, 144 and 162 inches, giving the truck a turning radius of 25 feet for the short wheelbase, and 29 feet for the longer one. The price of the 2-ton chassis with the equipment mentioned, is \$2,700.

### INTERNATIONAL

The International Harvester Co. of America, Chicago, has augmented its line of motor trucks by the addition of model E, a two-cylinder water-cooled type of 1,500 pounds capacity and 102-inch wheelbase. This model does not replace model M, the 1,000-pounds truck from which it differs, among other things, in that it has a steel frame instead of wood and uses semi-elliptic springs in front instead of elliptic. An I-beam front axle is used as compared with buggy-type on model M. The body space is also larger as the driver's compartment has been brought forward. The new model has a two-cylinder opposed L-head four-cycle motor of 20 horsepower, according to the maker, with 4½-inch bore and 5-inch stroke. It is fitted with a sealed governor. Double system of ignition is provided by magneto and dry cells. Lubrication is by means of gear pump. Speeds are two forward and one reverse. The drive is by 1-inch pitch chain to countershaft and thence by chain to rear wheel. Steering and control are on the right. Wheels are of the artillery type, 38 inches in diameter, outside tire fitted with 2½-inch S. A. E. standard side-flange detachable tires. At additional cost 3-inch tires are fitted. The express-body type has inside dimensions of 90 by 44 inches, the side boards being 12 inches deep with 6-inch flare boards. Price is not quoted.

### PLUG SALESMEN IN CONVENTION

Toledo, O., Jan. 25—The annual salesmen convention of the Champion Spark Plug Co., of Toledo, Ohio, was held January 19, 20 and 21. Monday and Tuesday were devoted to business discussions and Thursday the company entertained the salesmen in Detroit.



UPPER ILLUSTRATION, FEDERAL 1½-TON TRUCK; LOWER, PACKARD 3-TON

# Electric Lighting, Cranking and Ignition Systems

## Standard Types and How They Operate

Part II—Bijur and Splitdorf-Apelco

By Darwin S. Hatch

*Editor's Note—This is the third of a series of articles descriptive of standard types of electric lighting, starting and ignition systems as installed as stock equipment on 1915 cars. The first installment of the series appeared January 7 and covered the theory of the subject in general*

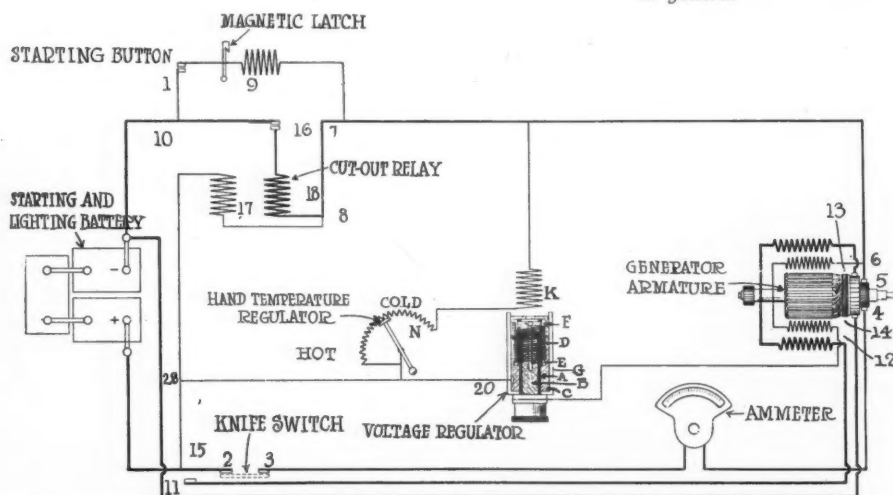


Fig. 20—Wiring diagram of Bijur system as applied to Packard motor cars, to assist in tracing the path of the current

**B**IJUR apparatus does not take in the ignition, that function being left to the car maker to arrange as he sees fit. The cranking and lighting equipment of Bijur make comprises either a separate motor and generator or a combined instrument. In the one case, the two separate units are two units of a three-unit electrical system, as we have defined it; and in the other the combined motor generator is one unit of a two-unit system. The Bijur company considers only the cranking and lighting and on this basis calls the combined instrument and its connections a single-unit system and the separate motor and generator and their connections as a two-unit system.

According to its nomenclature, the Bijur Motor Lighting Co. makes both single-unit systems and two-unit systems. The single-unit system consists of a motor-generator designed for chain drive from the main shaft, the single-unit acting as a starting motor and as a generator after the driving gas motor begins operating under its own power. The single-unit systems are designed for 12 volts, generally, and the concern manufactures a variety of sizes to meet the varying requirements of starting torque, etc.

The two-unit system consists of two separate units, a generator for supplying lights and charging a storage battery when the car is in operation, and a starting motor for cranking. The generators are designed for constant voltage and this voltage is maintained constant at all loads and speeds. An automatic regulator varies the exciting current in the generator field windings so as to compensate for all speed and load changes and maintain a constant voltage at the generator.

The automatic cutout for opening and closing the circuit between the generator and storage battery and the automatic regulator are located in a demountable aluminum box held on top of the generator by means of a single knurled nut. The connections between the generator and the regulator box are made by means of three split

pins projecting from the regulator box and which fit into three receptacles in the generator.

Should any derangement occur to the automatic cutout or to the regulating mechanism, it is not necessary to remove the generator or even send an expert to the car. A change in regulator boxes can be made without any electrical or mechanical skill. Unscrewing the knurled nut holding the box in place permits the box to be removed and the mechanical act of putting a new box in place on the generator effects all the connections between the generator, regulator and automatic switch. This demountable regulator box is a feature of all generators of the Bijur system.

The generators are reversible and the connections between generator and battery may be made haphazard without regard to polarity. If wrong connections are made no injury results—the generator will automatically reverse itself to charge the battery in the proper direction.

With the Bijur system, cars are wired as if for straight battery lighting, either on the one or the two-wire system. The additional circuits by reason of adding the generator consists of two leads from the generator to the terminals of the storage battery. An ammeter is connected in one of the wires between the generator and battery. If the single-wire system is used the one wire from

the generator to the battery is connected through an ammeter.

All appliances on a car receive current from the battery terminals. There are never more than two wires connecting to any of the units of the Bijur system and these two wires may be connected haphazard at any of the units.

There are two different types of starting motors and a number of sizes for each type. In one type the motors are geared down and drive to flywheel teeth through a roller clutch, the gears being in mesh with the flywheel only at the instant of starting. This type is standard on Packard cars.

The concern also has developed direct-acting motors capable of withstanding high speed. In the direct-acting types the motor has a square shaft which carries a pinion turning with the shaft, but free to move horizontally on this shaft. If the starting pedal is not released when the gas motor begins firing the starting motor will be driven at high speed by the gas motor in the case of the direct-acting motors. While the starting pedal or button should always be released when the gas motor starts, failure to do so will not injure the starting motor, as it is designed to withstand high speed.

The direct-acting motors are standard on Apperson, Jeffery Chesterfield six, Winton 21, and on the cars of the Russell Motor Car Co. of Canada. Fig. 21 shows the application of the motor to the Apperson 4-40.

Operation of the system can be explained by reference to the Packard installation, illustrated in Fig. 20.

The system consists of a motor-generator; a storage battery; a voltage regulator cut-out relay; a magnetic interlock and switch; a starting button on control board and a starting pedal.

When the button 1 is pressed the current flows from the battery positive through knife switch contacts 2 and 3, which are now in contact, through the ammeter into the generator at 4, through the armature, causing it to revolve at about 100 r.p.m., thus assisting in meshing the gears, out at 5, a portion being diverted at 6 through the field and regulator circuit windings. The remainder continues to 7 instead of going through 8, which is an open circuit, and goes through the magneto coil 9, which is in the magnetic interlock box to the right of the clutch housing. This magnetic coil now lifts a pawl, making a mechanical connection between the shifting pedal and gear train. The current flows to the button 1 and past 10 back to the battery negative pole.

The starter pedal now is pushed out and its first meshes gears with the revolving gear on the armature shaft and then with teeth on the flywheel. Pushing the pedal clear out fully engages the gears and trips a knife switch in the interlock box, giving full cranking current to the starting motor.

Throwing the knife switch disconnects the original starting button circuit by disconnecting contacts 2 and 3. The current now flows from battery to contacts 2 and 11 into the starting motor field 12, through the field winding into the armature at 13, out

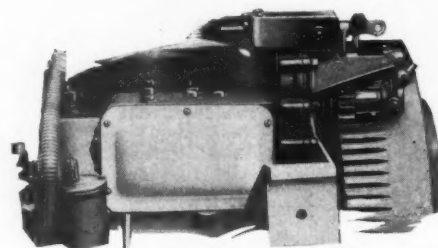


Fig. 21—Installation of Bijur starting motor to Apperson car



at 14, to the battery negative pole. This current cranks the motor. The starting pedal should be released sharply as soon as motor starts firing.

Releasing the starting pedal throws the starting gears out of mesh and returns the knife switch, again connecting 2 and 3, and breaks the circuit between 2 and 11. The motor-generator is now revolving and generates the charging current. This current flows from 4 through the ammeter through 3 and 2 to connection 15. No current can pass through the battery, as the current is broken at 16, causing it to flow through the shunt circuit, through magnetic coil 17, past 8, 7 and back into the generator at 5.

When the current flowing through the magnetic coil 17 reaches a pressure of about 7 volts it closes the contact points at 16 and connects the battery directly to the generator. The generator current now traverses the same circuit as before up to the point 15. While a small portion still takes the same route as formerly, the majority, the main charging circuit, enters the battery positive pole, goes out at the negative, passes 10 through contact 16; the magnetic winding 18, and passes on into the generator at the brush 5.

The generator is a shunt-wound machine in which the voltage increases with its speed. The voltage at high speeds would cause excessive overcharging of the battery, eventually ruining it. This variation is controlled by the voltage regulator, increasing or lessening the resistance in series with the field winding, or, in other words, by reducing the current flowing through the latter.

The voltage regulator consists of a non-magnetic metal tube G, an insulating bushing A attached to the lower end forming two concentric chambers not electrically connected. The chambers C and B are filled with mercury, which is covered with a special oil preparation which acts as a seal and lubricant. An iron plunger with a fine wire resistance D wound around its lower end mica insulated from plunger is immersed in the mercury. The lower end of the winding D is electrically connected to the plunger and the upper end is insulated from the tube but electrically connected to the needle E at F. The needle insulated from the plunger makes connection with the mercury.

Current after entering the voltage regulator at 20 must pass through all the windings above the mercury before reaching the needle and passing out again. Thus as the length of the wires above the mercury increases, the resistance in the field increases and the amount of current flowing through the field circuit is reduced and vice versa. This raising or lowering of this plunger governs the voltage and is in turn governed by the magnetic winding K.

This is actually on the outside of the tube G. The coil K is connected to both sides of the generator line. The voltage or pressure in the line governs the amount of current passing through K as the former increases, the strength of K increases, raising the plunger and weakening the field enough so that the voltage remains constant and vice versa. The generator furnishes approximately a 7-volt current, which is enough stronger than a discharged battery, the voltage of which is about 5.4, to force through a heavy charging current. As the battery becomes charged its pressure and that of the generator become almost equal, and the quantity of current flowing into the battery becomes very small.

On account of the variation of the internal resistance of the storage battery, a higher charging pressure or voltage is required in winter than in summer. Moving the lever N to the right reduces the resistance in this line and allows a greater amount of current to flow through the magnetic coil K, thus

reducing the generator voltage for hot weather. Moving the lever to the left increases the generator voltage for cold weather.

The cut-out relay acts as a check valve to prevent discharge of the battery when the gasoline motor is not running, or is running at a motor speed below 200 r.p.m. While the generator has a pressure of 7 volts, the points at 16 are held in contact and as soon as the generator current becomes so weak that the battery current overcomes it, the holding action of the coil 18 is changed to a bucking action, neutralizing 17 until the separating spring between these points overcomes the magnetic pressure and pulls them apart.

### SPLITDORF-APELCO

**SPLITDORF-APELCO**—The Splitdorf-Apelco starting and lighting system, an output of the Apple Electrical Co., formerly of Dayton, O., but now located in Newark, N. J., and marketed by the Splitdorf Electrical Co. As installed on 1915 Mitchell and Briscoe cars the output consists of a motor-generator, indicating automatic switch and starting switch, together with a 12-6-60-ampere-hour storage battery in the case of the Mitchell, and a 12-volt 35-ampere-hour storage battery in the case of the Briscoe.

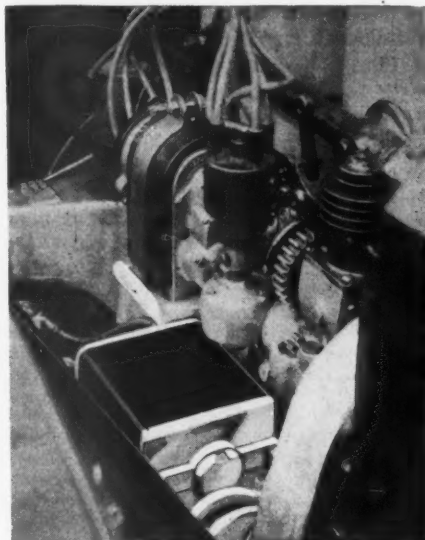


Fig. 22—Splitdorf-Apelco instrument as installed on Mitchell cars

No gears or clutches are employed in the construction of the motor-generator, the armature and commutator being the only revolving parts. These parts are carried on annular ball-bearings. Sprockets and silent chain are used for driving the starting and lighting unit, no additional reduction being necessary than that secured through the sprockets.

The current output of the dynamo is controlled by means of the special field windings. This inherent regulation feature makes it impossible to charge the battery at too high a rate, and at the same time makes the use of any regulators unnecessary. The indicating automatic switch is mounted in the circuit between dynamo and battery. Its function is to make connection between these two units when the voltage of the dynamo exceeds that of the battery—as well as to break connection when the battery voltage exceeds that of the dynamo. In other words, the switch automatically closes when the dynamo is being driven at sufficient speed to charge the battery, allowing current to flow from the dynamo into the storage battery.

When the dynamo is not running at sufficient speed to charge the battery, however,

or is stopped, the switch automatically opens, preventing a discharge of current from the storage battery back through the dynamo. This instrument is equipped with an indicating dial which shows the lettering Charge On when current is flowing into the battery, and Charge Off when the battery is not being charged. The use of the switch makes an ammeter unnecessary. It is mounted on the dash and shows at a glance whether or not the battery is receiving a charge. The starting switch is one built especially for use with the system. Its design is such as to make arcing of the contacts impossible.

A 12-6-60-ampere-hour storage battery is being used in connection with the Splitdorf-Apelco systems on the Mitchell cars. The battery is divided into two individual 6-volt, 60-ampere-hour cells, these cells being enclosed in one case. At the time of starting, the starting switch is pressed down. The two 6-volt cells are then connected in series through the switch, furnishing 12-volt current to the motor-generator. This, however, does not affect the voltage to the lamps, as 6-volt current is supplied for lighting and ignition at all times. As soon as the starting switch is released, however, the two battery cells are connected in parallel and charged as a 6-volt 120-ampere-hour battery.

The use of 12 volts for starting insures sufficient power to spin the motor under normal conditions, as well as cuts down the current draw from the battery. At the same time, 6 volts for charging makes it possible for the generator to begin charging at very low car speeds, as well as makes the use of standard 6½ or 7-volt bulbs possible for the various lamps on the car. Fig. 22 shows the system applied to Mitchell cars.

A 12-volt, 35-ampere-hour storage battery is being used in connection with the Briscoe cars. This battery supplies 12-volt current to the motor-generator at the time of starting, as well as 12-volt current to the lighting lines. The use of 12-volts for starting insures sufficient power to spin the motor under normal conditions, as well as cuts down the current draw from the battery. 14-volt bulbs are recommended for use in the side and tail lights. A resistance in the headlight line cuts the voltage down, making it possible to use a 7-volt bulb for this lamp.

Another Splitdorf-Apelco system has the ignition and lighting combined and the starter separate. Motor and starting switch form one unit and generator and timer-distributor form the other unit of the two-unit system.

(To Be Continued.)

### REPUBLIC TRUCK PROGRESS

Alma, Mich., Jan. 21—At a meeting of the stockholders of the Republic Motor Truck Co., it was voted unanimously to increase the capital stock from \$50,000 to \$250,000. The company was organized in July, 1913, under the name of the Alma Motor Truck Co., and of its original capitalization only \$15,000 was paid in at the time. Alma citizens subscribed for and finally paid up practically all of the original \$50,000 capital and it is understood that they will contribute most of the \$200,000 increase in capitalization. An average of twelve trucks are made daily and it is hoped to increase this output gradually.

### FROST INCREASES STOCK

Jackson, Mich., Jan. 25—The capital stock of the Frost Gear and Forge Co., which had been increased last year to \$300,000 has now been increased to \$400,000.

# The Readers' Clearing House

## GNOME MOTOR VALVE OPERATION Inlets Are Automatic in the Piston Head— How the Fuel is Fed

LAKE CRYSTAL, Minn.—Editor Motor Age—Kindly diagram the valve mechanism of the Gnome seven-cylinder motor and tell how the fuel and oil is fed.

2—How is the power compared with other motors of the same dimensions?

3—Has this motor high or low compression?

4—What is the highest speed the Burman special has shown?—Leon & Wendt.

1—The exhaust valve is mounted in the cylinder head, Fig. 1, its seating being screwed in by means of a special box spanner. On the fourteen-cylinder model the valve is operated directly by an overhead rocker arm with a gunmetal rocker R at its extremity coming in contact with the extremity of the valve stem VS. As in standard motor car practice, the valve is opened under the lift of the vertical push rod, actuated by the cam. The distinctive feature is the use of a four-blade leaf spring S with a forked end encircling the valve stems and pressing against a collar on its extremity. On the seven-cylinder model the movement is reversed, the valve being opened on the downward pull of the push rod, this lifting the outer extremity of the main rocker arm, which tips a secondary and smaller rocker in direct contact with the extremity of the valve stem. The springs are the same in each case.

The intake valves are automatic, and are mounted in the head of the piston. The valve seating is in halves, the lower portion being made to receive the wrist pin

and connecting rod, and the upper portion, carrying the valve, being screwed into it. The spring is composed of four flat blades, with the hollowed stem of the automatic valve passing through their center and their two extremities attached to small levers calculated to give balance against centrifugal force. The springs are naturally within the piston, and are lubricated by splash from the crankchamber. They are a delicate construction, for it is necessary that they shall be accurately balanced so as to have no tendency to fly open under the action of centrifugal force. The intake valve is withdrawn by the use of special tools through the cylinder head, the exhaust valve being first dismantled.

Coming to the manner in which the exhaust valves are operated, this at first sight appears to be one of the most complicated parts of the motor, probably because it is one in which standard practice is most widely departed from. Within the cylindrical casing bolted to the rear face of the crankcase are seven thin flat-faced steel rings L, in Fig. 2, forming female cams. Across a diameter of each ring is a pair of projecting rods fitting in brass guides and having their extremities terminating in a knuckle eye receiving the adjustable push rods operating the overhead rocker arms R of the exhaust valve. The guides are not all in the same plane, the difference being equal to the thickness of the steel rings, the total thickness being practically 2 inches. Within the female cams is a group of seven male cams of the same total thickness as the former and rotating within them. As the boss of the male cam comes in contact with the flattened portion of the ring forming the female cam, the arm is pushed outward and the exhaust valve opened through the medium of the push rod and overhead rocker.

The number of cams is the same for the fourteen as for the seven-cylinder motor; on the latter, however, there is but one flattened portion in the female cam ring, and only one of the projecting arms terminates in a knuckle to receive the adjustable push rod, the opposite arm being merely a guide. The flattened portion is at the guide side; thus, when the male cam comes in contact with it the arm is caused to descend in its guide and a pull exerted on what has come to be known as the push rod. For the fourteen-cylinder motor the action is direct, for there are two flattened portions on the female cam ring, one at the base of each projecting arm, and they are lifted in exactly the same manner as the tappets of a standard type of motor. The group of male cams is driven primarily by a pinion on the crankshaft in mesh with two intermediate pinions, transferring their motion to the

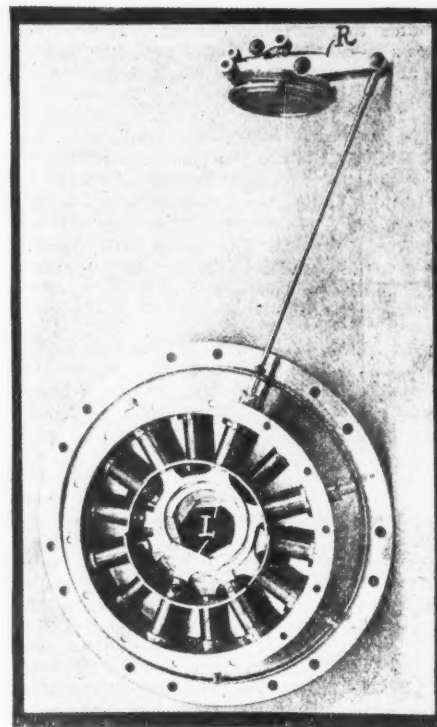


Fig. 2—How the exhaust valves of the Gnome motor are operated by means of rocker arms and cams, the female portions of the latter being lettered L.

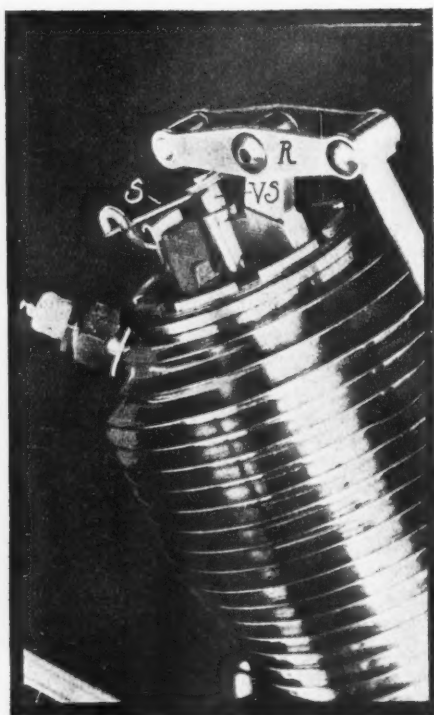


Fig. 1—The exhaust valves of the Gnome rotary motor are operated by rockers R. The valve stem is lettered VS.

male cam pinion gear turning free on the extremity of the crankshaft.

The crankshaft of the Gnome is fixed and hollow. Advantage is taken of this to supply fuel and lubricant to the motor.

The lubricant, consisting of pure castor oil, is fed to the two pumps by gravity and delivered from them through the sight feeds carried in any suitable position to tubes mounted within the hollow shaft. The oil is thus taken direct to the main bearings, to the crankpins and to the connecting rod ends. The oil driven through the bearings into the crankchamber suffices for lubricating the cylinder walls, but a large amount is taken into the combustion chambers with the mixture and driven out with the exhaust. It is this feature which makes the Gnome a considerable consumer of lubricant, the makers' estimate being 7 pints an hour for the 100-horsepower motor; but in practice this is largely exceeded. The gasoline consumption is given as 300 to 350 grammes per horsepower.

There is no carbureter in the usual acceptance of that term, the substitute consisting of a brass elbow mounted on the hollow end of the fixed crankshaft. Within the elbow is an ordinary type of butterfly throttle, and around its vertical portion an ordinary air sleeve, generally employed only for starting. Gasoline is brought to this carbureter—which is really not de-





Fig. 3—The tent garage shown was built by a reader of Motor Age at a cost of \$16.50. The floor is made of second-hand lumber costing \$4

signed to carburete—by means of a copper tube with a slightly restricted outlet. There is neither float chamber nor jet. In many of the tests made at the factory the fourteen-cylinder motor was operated with the extremity of the gasoline pipe pushed into the hollow crankshaft, speed being regulated entirely by increasing or decreasing the flow through the tap in the base of the tank. Even under these conditions the motor has been throttled down to run at 350 r. p. m. without mis-firing. Its normal speed is 1,000 to 1,200 revolutions a minute. From the crank-chamber the mixture passes into the cylinders through the automatic intake valve mounted in the head of each piston.

2—It is difficult to make any comparison since the Gnome is a seven or fourteen-cylinder type. The dimensions would not be the determining factor.

3—The compression is comparatively high.

4—This car has shown over 110 miles per hour.

#### READER BUILT GARAGE FOR \$16.50 Used Balloon Silk for Covering—Floor of Second-Hand Lumber

New Haven, Conn.—Editor Motor Age—A second-hand car logically requires a second-hand garage. Such a garage I could not find in the open market. My present location being rented, I required a temporary garage; first, because the landlord would permit no permanent building, and second, because I wished, like the Arab, the ability "to fold my tent and steal silently away" whenever the spirit moved.

From a contractor in the next block I bought sufficient used lumber for \$4 to make a floor 12 by 15 feet. Next came the widespreading roof of balloon silk, 13 by 12 feet, which cost \$10. I bought a dozen garden variety of clothes poles, used to prop up clothes lines, for \$1.25. I made a ridge of three poles, end to end. A frame to hold this consumed the remainder of the dozen. The long edges of the roof are held to paraffined ropes to convenient apple trees, as shown in Fig. 3.

After 6 months, several gales and some

snow, the roof is as good as new. The surrounding buildings keep the wind from getting under and transforming it into an aeroplane. The car keeps dry and I figure that the dampness of misty nights does less harm to a second-hand car than the damage an ordinary garage rental of from \$5 to \$10 a month would do my bank account. Total cost of garage, \$16.50, and no more expense in sight for 2 or 3 years at least.—Edwin B. Whiting.

#### HOW TO CALCULATE DISPLACEMENT

##### Formula Given for Figuring the Cubic Capacity of Any Motor

Bucyrus, O.—Editor Motor Age—Kindly give the formula for figuring the displacement of a motor.

2—What make of transmission is used on the Buick model 10?

3—What kind of valve arrangement has the Gnome motor?—C. E. Shuppe.

1—The displacement of any motor may be figured from the following formula: Displacement equals  $D^2 \times .7854 \times N \times S$  Where D is the bore in inches, N the number of cylinders and S the stroke in inches.

Thus, for a four-cylinder 4 by 5-inch motor the displacement would be  $4 \times 4 \times .7854 \times 4 \times 5$  or  $16 \times .7854 \times 20$  equals 251.33 cubic inches.

2—The transmission system was made by the Buick company.

3—The valve arrangement and operation of the Gnome motor is explained in answer to the inquiry of Leon & Wendt on the previous page.

#### ON AIR-COOLED KNIGHT MOTORS One of the first was of This Type—Its Probable Disadvantages

Phoenix, B. C.—Editor Motor Age—In an engine using removable water jackets, which metal is the most desirable to use, gray iron, aluminum or copper? The cylinder head being gray iron in any case?

2—Could a motor of the Knight type be made as an air-cooled type, or would the sleeves interfere with radiation?

3—What would be the approximate length and width of ports in a  $3\frac{1}{2}$  by 4 Knight?

4—What is the actual travel of the sleeves as compared to piston travel?—A. E. Black.

1—Copper is better than the others you name because it will conduct the heat away from the cylinder walls faster.

2—Motor Age does not know of such an engine regularly manufactured. One of

the first Knight engines was air-cooled. There are two experimental air-cooled Knight engines running in England satisfactorily. One great disadvantage of an air-cooled sleeve motor would be the need of special designs to prevent the sleeves sticking. If the outer air did not take the heat away from the cylinders fast enough the sleeves would become so hot that they would become warped and stick. The heat in such an engine would necessarily have to travel first through the inner sleeve, then through the outer sleeve and lastly through the cylinder wall, in order to pass to the outer air. This lengthy course would in all probability cause excessive heating of the sleeves.

3—Dimensions for the ports will vary with the results desired. There is no rule by which one can figure these dimensions.

4—In the Moline-Knight the sleeve travel is  $1\frac{1}{8}$  and the stroke 6 inches.

#### A. A. A. MAN COMMENTS ON ROADS Agrees With W. E. McKee That Beautification Plan is Wrong

Sioux City, Ia.—Editor Motor Age—It is with considerable satisfaction I read of the article by W. E. McKee, of Montezuma, Ia., upon the beautification idea and its objections pertaining to highways, for the reason that Mr. McKee has clearly shown his knowledge of Iowa highways in general.

For the past 7 or 8 years I have been active in the formation of various highway associations for the purpose of securing good highways in this portion of Iowa, as well as the adjoining states of Nebraska and South Dakota, and anyone posted as to the troubles encountered to obtain and maintain first-class highways in this section, where we rely almost entirely on dirt roads, knows the two important requirements for a good dirt road is draining and drainage.

The first, of course, requiring properly crowned roadway, whereby the surface water will be carried to ditches at the side of the road; the second, that the water so drained to the ditches will, by drainage, be carried away from the ditches and the roadway, as otherwise this ditch water is absorbed by the road bed, keeping same irregularly soft, developing soft spots and making an uneven road surface.

The only way this road surface can be maintained in a smooth, crowned condition is by dragging, and anyone familiar

#### Questions Answered and Communications Received

Leon & Wendt.....Lake Crystal, Minn.  
Edwin B. Whiting....New Haven, Conn.  
C. E. Shuppe.....Bucyrus, O.  
A. E. Black.....Phoenix, B. C.  
C. A. Kneidler.....Sioux City, Ia.  
C. C. Shaw.....Lockhart, Tex.  
L. D. ....Chicago  
A Subscriber.....Council Bluffs, Ia.  
A Subscriber.....Toledo, O.  
C. C. H.....Sedgwick, Kan.  
Albert M. Salley.....Orangeburg, S. C.  
Maddox Owan.....Pleasureville, Ky.

No communications not signed by the reader's full name and address will be answered.

with the purpose of dragging knows the time to drag is at a time following a rain, when the soil has dried sufficiently to permit the use of the drag, but at all times while the soil is still moist so that it will pack and stay "put."

The one great difficulty in maintaining a uniform good roadway in this section is the shade of trees planted and growing alongside of the roadway, for the reason that the roadway where exposed to sunshine may be in prime condition for the use of the drag until a shaded stretch of roadway is met, where the surface will be too wet to operate the drag. The shaded roadway otherwise makes a slippery and dangerous spot at times when the roadway at that point would have been in first class condition if the trees had been removed.

It is my judgment Mr. McKee is absolutely correct, for if trees were planted along the side of dirt roads the road's usefulness would be curtailed and depreciated at least 25 per cent, if not more, as compared to dirt roadways, where there were no trees alongside.

It would appeal to one living in this section, where the rainfall runs from 25 inches per annum up, and where there are dirt roads, the proper thing is to get rid of all trees alongside the roadway and not add any.

It is also our opinion that tourists prefer to have their view of the surrounding country as little obscured as possible. Waving fields of grain, ripening orchards, distant glistening stream or lake, verdure-clad hillside and snow-clad mountain top, with their changing scenery are far more interesting and desirable to 99 per cent of the tourists than would be an unchanging monotonous row of trees hemming them in on either side.—C. A. Kneidler.

#### Wants to Install a Dual System

Lockhart, Texas.—Editor Motor Age—How may a 1910 White gasoline car be wired for battery ignition? It has Splitdorf magneto and I would like to arrange it so it may be started on the battery. It is almost impossible to spin it fast enough to start it on the magneto. 2—Could the battery be attached through the magneto without using a coil?—C. C. Shaw.

To install a battery system you will have to use a timer of some sort and a coil to step-up the battery voltage. It may be possible to use the magneto interrupter provided you have the proper type of Splitdorf magneto in which both battery and magneto primaries are controlled

by the one set of breaker points. Motor Age suggests you take the matter up with the Splitdorf company and perhaps you can exchange your present magneto for one of the dual type.

#### TIMING OF MOLINE-KNIGHT MOTOR Figures Given for Engines Tested by the A. C. A.—Knight Patent Number

Chicago.—Editor Motor Age—What was the timing of the Moline-Knight at the official test held in New York?

2—What was the timing of the two Daimler-Knight engines in England at the official test?

3—Kindly give a sketch of the camshafts used in the three different motors.

4—What are the patent numbers of the Knight sleeve valve engine?—L. P.

1—The timing of the Moline-Knight used in the official test is as follows: Inlet opens 10 degrees past top center and closes 35 degrees past bottom dead center. Exhaust opens 40 degrees before bottom dead center and closes 5 degrees past top center.

2—This is not obtainable.

3—You can get a sketch of the shaft of the Moline-Knight by writing to the Moline-Knight Automobile Co., Moline, Ill. It is not possible at this time to get a sketch of the Daimler shafts.

4—The patent for which Charles Y. Knight applied on June 4, 1906, was granted March 24, 1914, and is numbered 1,090,991. This refers to the American patent.

#### CONNECTING METERS IN CIRCUIT How Instruments Are Wired in Westinghouse System

Sedgwick, Kan.—Editor Motor Age—How can a voltmeter and ammeter be connected in the Westinghouse cranking and lighting system used on the 1914 Hupmobile 32?

2—Would it be possible to substitute Timken bearings in place of those at present in the wheels?

3—What kind of lubricant is Oildag?—C. C. H.

1—The illustration in Fig. 5 shows how both meters may be connected in the circuit.

2—It may be possible but for more definite information you will have to submit blue prints of the parts, to the Timken Bearing Co., Canton, O.

3—Oildag is commonly called liquid graphite. Really it is a deflocculated graphite or graphite diffused in oil. For cylinder work the Oildag is further diluted with ordinary cylinder oil.

#### Square Motors in 1903

Toledo, O.—Editor Motor Age—Did the majority of motor cars built in 1900 to 1903 have motors with a larger bore than stroke, or square motors?

2—Was there any year in which the majority of motors had a larger bore than stroke?—A. Subscriber.

1—Square motors were more in evidence in the period 1900 to 1903 than were motors of large bore and short stroke.

2—No.

#### WIRING REMY MODEL RL MAGNETO Liquid for Brightening Leather Upholstery Reliners for Worn Tires

Council Bluffs, Ia.—Editor Motor Age—Kindly give wiring diagram of the Remy ignition system with Model R. L. magneto, as used on the Overland, model 69.

2—Is there any advantage in having the body supported in such a way that there is no weight on the springs?

3—Would the gas mixture, as sucked through the carburetor, be injurious to tires if pumped into them?

4—Are reliners for casings, which are stone bruised but otherwise good, a success? Would it pay to have the casing vulcanized, or patched on the inside?

5—Kindly give a formula for a leather dressing to brighten up the upholstery of a car.—A. Subscriber.

1—The complete wiring diagram of the Remy system on the Overland model 69 is shown in Fig. 4. The wires are lettered according to the color of the insulation so you will have little difficulty getting them properly connected.

2—This is an impossible construction.

3—Yes. Rubber is soluble in gasoline, and the spray would soften the rubber of the inner tube.

4—Reliners are a success for such casings and add considerably to the life of the old tires. Whether it would pay to have it vulcanized depends upon the extent of the bruise. Take the matter up with a repairman and find out the charges, for vulcanizing. If not too high the work should be done as vulcanizing always is better than patching.

5—A good liquid for brightening leather is composed of a mixture of one-half linseed oil and one-half neatsfoot oil. The oil is rubbed over the leather very lightly and then wiped with a clean cloth. This will tend to soften the leather also.

#### NO CARS FOR MOUNTAIN ROADS? Reader Says No Vehicle on Market Efficient in Hilly Country

Orangeburg, S. C.—Editor Motor Age—Several years of experience with motor cars in mountainous and hilly country, and close observation of the performance of many cars on mountain roads, bring me to the conclusion that there is not a suitable car on the American market for this class of work. While it is probable that this statement would be challenged by the champions of all the low-priced cars on the market, it is doubtful if even the most enterprising of salesmen, after becoming acquainted with the task that a mountain doctor's car must perform, would guarantee any of the small cars on the market to stand the pace 1 year. Of course, these remarks refer to the unimproved roads in mountainous country little frequented by the wealthy tourist, and not to the smooth, macadam-paved hills of some of the more populous states.

In the first place, the car for mountain use must not be too large; the wheelbase

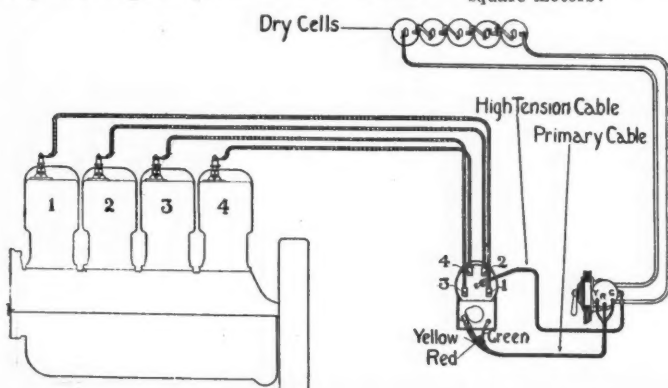


Fig. 4—Wiring diagram of the Remy ignition system on the Overland model 69, showing the connections from magneto and battery to the coil



should not exceed 100 inches, if sharp curves in narrow roads are to be negotiated; the weight should be less than 2,000 pounds, ready for the road. A light car can cross soft places where a heavy car would sink to the hubs. Tires are a large item in the mountains. They are not worn out by use, but are destroyed by cuts and bruises from stones, by friction when the rear wheels slip, or when the brakes are applied vigorously, as they frequently must be. To avoid excessive tire cost, therefore, the tires must be as small as possible, consistent with the weight of the car. In practice, the 30 by 3½ size will be found to give good results.

To prescribe "small bore, long stroke, high-speed" for the motor does not answer everything. Great pulling power at low crankshaft speeds, light weight, and freedom from heating troubles are some of the qualities the motor for mountain work must have, and the modern type of motor lacks some or all of these. A big, heavy motor would only rack the car to pieces, destroy tires, add weight, and consume precious fuel. Power is a relative term; and the ability of the car will depend more on proper motor design, car balance, and a suitable gear ratio, than on liberal cylinder dimensions. A four-cylinder, block-cast motor, 3¼ by 4, or 3½ by 4, preferably of the overhead valve type, and so designed as to have great pulling power at low speeds, and to develop its maximum power at not more than 1,500 r. p. m., would be ample for a two-passenger car on 30-inch wheels, provided the gear ratio be not less than 4 to 1. There should be three generous crankshaft bearings, a thoroughly efficient and dependable oiling system, and a cooling system that includes a water pump. This last requirement disqualifies practically every low-priced car on the market. The thermo-syphon system, while satisfactory on small cars in level country, does not keep the motor heat within reasonable limits where there is much prolonged first-and-second-speed work to be done.

There must be three speeds in the gearset: many long grades that the car can almost, but not quite, make in high, can be climbed easily in second speed; the two-speed car, however, must crawl along for perhaps ½ miles, and arrive at a smooth stretch only to find that the motor is badly overheated. The gearset should be in unit with the motor, to keep down weight and preserve alignment on uneven roads. Both clutch and brakes must have considerable over-capacity, as unusual demands will be made on both. In fact, except possibly for the so-called refinements, no part of the mountain car may be slighted. Life too often depends on the reliability of steering gear, brakes, or clutch.

Motoring among steep grades calls for many features peculiarly adapted to the conditions encountered. For instance, the gasoline supply must be at all times high enough above the carburetor to keep the

latter well supplied. The location of the gas tank in the cowl is the logical solution of this problem.

The car, reduced to tabular form, would be about as follows:

Wheelbase, 100 inches; tire, 30 by 3½ inches, on Q. D. rims.

Motor, four-cylinder, block-cast, valve-in-the-head type, three-bearing crankshaft, forced oil to main bearings by gear pump; bore, 3¼ inches, stroke, 4 inches.

Cooling, centrifugal water pump, large radiator, and power fan.

Gearset, in unit with motor; leather-faced cone clutch completely inclosed; ratios: low, 12 to 1; second, 6 to 1; direct, 4 to 1.

Rear axle, three-quarter floating type, propeller shaft inclosed; two sets of brakes, 10-inch drums, 1¾ inches wide.

Gasoline tank, in cowl; 10 gallons capacity.

Frame, heavy channel section, with 3½-inch kick-up over rear axle; narrowed in front to allow turning in 30-foot circle.

The tread, type of wheels, ignition system, body style, and general equipment may follow standard practice. Electric starting and lighting are not essential. Such a car, manufactured in quantities, could be sold at a moderate price, and would be in steady demand by physicians, merchants, salesmen, mining men, mail carriers, and many others who have much road work in hilly country and over bad roads generally, where ordinary cars "have no business to go."—Albert M. Salley.

#### QUESTIONS ABOUT THE FORD CAR Connecting Rod and Piston Weights— Accessories for This Car

Pleasureville, Ky.—Editor Motor Age—Do the four pistons and connecting rods on the Ford car weigh exactly the same?

2—What is the best way to lighten pistons? By drilling them or turning them down on a lathe on the inside below the wristpin?

3—If you advise drilling, what size drill holes should be used?

4—Does drilling weaken them or cause inadequate lubrication?

5—Kindly give the names of manufacturers of V-shaped radiators for Ford cars.

6—How much more capacity do they have than the Ford tubular radiators?

7—Give the names of manufacturers of wood rims for steering wheels.

8—Where may leather be obtained to cover them?

9—I took a piece of 1-inch lamp wicking, slit about 6 inches from the end and ran the valve stem through it, letting the wick pass through the coil spring up high against the valve guide. Then, leaving enough slack in the wick to touch the bottom of the valve push rod chamber, I slit it again and ran the second valve through and so on. The wicks carry plenty of oil to lubricate the stems nicely, reducing wear to a minimum.—Maddox Owan.

1—They vary little in weight. The difference may be but a fraction of an ounce.

2—Drilling would be the better way.

3—Ten ⅜-inch holes equally spaced around the piston will do.

4—Drilling removes metal and weakens the piston to some extent. It would allow of excess oil running back into the crankcase. It would not interfere with lubrication of the upper portion of the cylinder and piston.

5—Ford V shaped radiators may be obtained of: Auto Parts Co., Providence, R. I.; Fedders Mfg. Co., Buffalo, N. Y.; Auto Parts Co., Chicago.

6—Most makes have the same capacity as the Ford radiator.

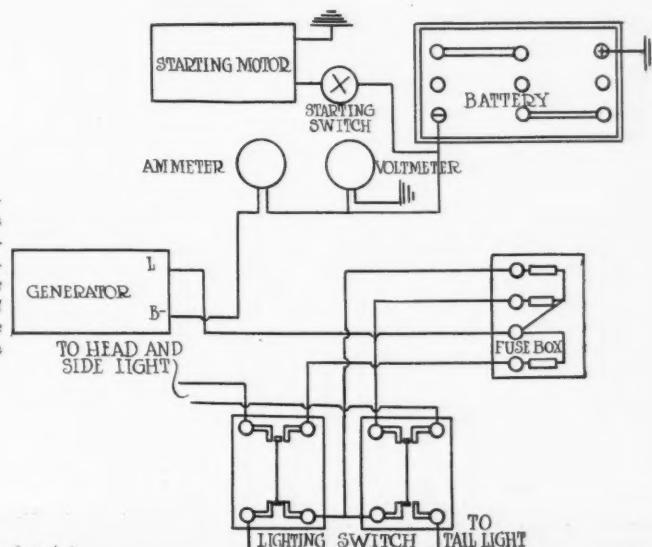
7—The following are a few makers of wood rims for steering wheels. The names appear in the Automobile Trade Directory: American Wood Rim Co., Onaway, Mich.; Detroit Auto Dash Co., Detroit, Mich.; Auto City Bow Co., Detroit, Mich.; Tucker Woodwork Co., Sidney, O.

8—For steering wheel covers write to: Atlas Specialty Mfg. Co., Chicago; Nathan Novelty Mfg. Co., New York; Cancos Mfg. Co., Philadelphia, Pa.

#### Soldering Aluminum and Brass

In a recent issue of Motor Age in this department it was stated that aluminum and brass could not be soldered together effectively but the Ludlow Auto Engineering Co., Philadelphia, takes exception to this statement, claiming that one of its products, called So-Luminum, is an efficient solder for this work. To substantiate its claims the concern has sent Motor Age samples showing what this substance can do and from all appearances the claims are not exaggerated.

Wiring diagram of Westinghouse system used on the 1914 Hupmobile, showing installation of a voltmeter and ammeter. The former always is placed across the line and the latter in series as shown in the illustration





# From the Four Winds



**GIDDY License Plates for Hoosiers**—The 1915 license plates in Indiana are green figures and letters on a pink background. About 10,000 licenses have been sold thus far. Nearly 70,000 licenses were sold in 1914.

**Motor Car Crimes Increase**—The annual report of the Milwaukee police department shows that during the year 1914 there were made 247 arrests for violation of the speed ordinances, 241 for violating rules of the road, and 22 for taking motor car without owner's consent. In each instance the number was greater than for the same violations during 1913, but the showing is considered good in view of the fact that there has been an increase of more than 40 per cent in the number of cars owned in Milwaukee.

**Touring Club Branches Established**—For the benefit of eastern tourists visiting the California expositions with their motor cars, the Automobile Club of Southern California has established a branch at San Diego, located in the U. S. Grant hotel. The club's branch renders the same service to motorists at San Diego as at the Los Angeles headquarters. A branch of the club also has been opened in Santa Barbara in the Chamber of Commerce building. One of the club's route cars is now in Santa Barbara county charting the scenic highways of that part of the state, and maps are to be prepared at once for club members and visiting motorists.

**Hartford Tackles Parking Problem**—The park department of Hartford, Conn., has taken an active interest in the matter of street garaging of cars. Superintendent of Parks George A. Parker has conferred with officers of the Automobile Club of Hartford and a plan has been drawn up for consideration. The public highway from the Heublein hotel, at Wells and Mulberry streets, to the memorial arch is regarded as the logical location for parking spaces. Under the proposed plan the present curb line along the improved road and skirting the bank of the Park river is to be set back and a new line established. It is proposed to set out shade trees along the river bank so that the cars will be obscured from Bushnell park, on the opposite side of the river.

**Busy Year for Owner's Association**—The Grand Rapids Automobile Owner's Association has elected the following officers for the coming year: President, Howard F. Baxter; directors, Paul F. Steketee; B. P. Merrick, Adolph Brandt, Ralph Tietzort, A. S. Hicks. The president and directors will choose the other officers. The 1914 reports showed that during the year just closed twenty-six accident cases had been handled and with the exception of two, all had been settled. A number of roads were placarded, 100 danger signs were posted, and through the work of the vigilance committee, speeding was reduced 50 per cent. The association plans to placard other routes in the vicinity in the spring. It will give its indorsement to the plan to make all vehicles carry lights, and to force the adoption of a standard tread for sleighs.

**More War Cars for Canadian Tommies**—J. C. Eaton of Toronto is donating fifteen armored motor cars to the government, costing \$100,000. The government is preparing twenty-five more at its own expense, making a total of forty machines, which will accompany the second contingent. These machines are being made under the direction

of W. K. McNaught at the Russell Motor Car Co. They are being armed with machine guns and they will be very much stronger than those that accompanied the first Canadian contingent. The armor will be almost double the thickness and the turret and other vital parts will be encased in quarter-inch harveized steel. This reinforcement is characteristic of the improvements on every other part of the car. They will also be twice as heavily armed. John D. Patterson of Woodstock has offered a powerful army motor ambulance, of war office standard, for service at the front with the Canadian expeditionary force. The offer is made through Lieutenant-Colonel McMullen, commanding officer of the Twenty-second regiment, Oxford Rifles.

**Schedule Contests for Small Cars**—The Light Car Club of New Jersey will inaugurate the season's sports by holding its second hill-climb, pint fuel economy contest and other events February 22 at Teaneck. The program will be opened by a reliability run from Newark to Teaneck by way of Paterson, Bloomfield, Passaic, Rutherford and Hackensack. The events will consist of a 2,000-yard hillclimb on a one in seven grade, a 1,500-yard reverse gear race, a 1,000-yard upgrade on low gear, a starting event with the motors cold, a 1,000-yard upgrade race on high gear,

a 2-mile secret time race, and a pint gasoline economy race. The contests will be open to vehicles of the three following classifications: Class A, up to 106 cubic inches cylinder displacement and 950 pounds chassis weights. Class B, from 106 to 160 cubic inches and from 951 to 1,150 pounds chassis weight. Class C, from 161 cubic inches to 210 cubic inches and 1,151 to 1,351 pounds chassis weight. Entries close February 6.

**Buy Motor Car or Lose \$750**—Captains in the Chicago police department must purchase motor cars and provide for their maintenance or lose \$750 of their annual salary, it was ruled recently by Mayor Harrison. The annual salary of the captains was raised to \$3,000 last year, with the understanding that each would purchase a motor car. Recently it was discovered that not a captain had complied with the agreement.

**Start War on Grade Crossings**—Among the matters considered at the annual meeting of the Ohio Association of County Commissioners, which met at Columbus recently, was the question of eliminating grade crossings in rural districts. A resolution was adopted asking for the same power in counties as is now exercised in cities to compel railroads to eliminate grade crossings. At present counties cannot exert the same compulsion as cities but must wait until the railroads are willing to co-operate in the grade crossing elimination.

**Mexican Warriors Tax Dodgers**—The government of the federal district in which the City of Mexico is located has published a notice that generals and officers of the Conventionist army, who have in their possession motor cars, must pay licenses on the vehicles as is required of every owner or user of such vehicles or forfeit their machines. It is claimed that many of the army officers had failed to pay licenses on their cars, in the belief that they were exempt from the operation of that feature of the law of the federal district.

**War on Toll Gates Continued**—Representatives of all the prominent motor clubs of central Pennsylvania met at Lancaster last week and discussed methods of work for the abolition of all toll roads along the Lincoln highway between Philadelphia and Gettysburg; the reduction of tolls in other places and the securing the employment of convict labor on public roads. An organization was effected and plans are now being made to have a bill introduced in the legislature abolishing all toll gates and toll charges along the Lincoln highway. A complaint will be laid before the state public service commission against the excessive toll charges of the Pennsylvania railroad for crossing the Columbia bridge and steps will be taken in the convict labor campaign.

**American Flags Protect Car**—Manager Albion L. Danforth of the Boston Cadillac agency had his troubles last week when he began plans to ship to South America an eight-cylinder car ordered by Frederic J. Stimpson, newly appointed ambassador to the Argentine Republic. The car had to go by way of London, and Mr. Danforth was forced to get United States government seals from Secretary of State William J. Bryan to paste on the crate. On all four sides of the crate a reproduction of the American flag has been pasted together with other indications that it is the property of an American official and so not subject to seizure.

## Coming Motor Events

### SHOWS AND CONVENTIONS

January 23-30—Chicago show.  
January 23-30—Montreal show.  
January 23-30—Show, Portland, Ore.  
January 25-30—Show, Buffalo, N. Y.  
January 25-30—Show, Fall River, Mass.  
January 25-30—Show, Tiffin, O.  
January 30-February 6—Minneapolis show.  
January 30-February 6—Show, Columbus.  
February 1-6—Show, Louisville, Ky.  
February 2-6—Show, Kalamazoo, Mich.  
February 3-6—Show, St. Joseph, Mo.  
February 4-6—Show, Marinette, Mich.  
February 6-13—Show, Hartford, Conn.  
February 8-13—Show, Toledo, O.  
February 8-11—Show, Peoria, Ill.  
February 8-15—Show, Kansas City, Mo.  
February 9-12—Show, Eau Claire, Wis.  
February 10-13—Show, Davenport, Ia.  
February 15-20—Show, Omaha, Neb.  
February 15-20—Show, Grand Rapids, Mich.  
February 15-20—Show, Tacoma, Wash.  
February 15-20—Show, Fort Wayne, Ind.  
February 16-18—Show, Bloomington, Ill.  
February 18-20—Show, Racine, Wis.  
February 23-27—Show, Ft. Dodge, Ia.  
February 23-27—Show, Syracuse, N. Y.  
February—Show, Rockford, Ill.  
March—Show, Shelbyville, Ind.  
March 6-13—Show, Boston, Mass.  
March 8-13—Show, Des Moines, Ia.  
March 13-20—Show, Harrisburg, Pa.

### CONTESTS

\* February 22—Vanderbilt cup race, San Francisco, Cal.  
\* February 27—Grand prize road race, San Francisco, Cal.  
March 17—Road race, Venice, Cal.  
\* May 29—500-mile speedway race, Indianapolis, Ind.  
June 9—200-mile race, Galesburg, Ill.  
June 19—Chicago speedway race.  
June 26—300-mile race, Sioux City, Ia.  
\* July 4-5—Speedway races, Tacoma, Wash.  
August 20-21—Elgin road races.  
\* Sanctioned by A. A. A.





# Among the Makers and Dealers



## FALLS Rubber Increases Capital Stock—

Papers have been filed with the secretary of state increasing the capital stock of the Falls Rubber Co., of Akron, O., from \$200,000 to \$300,000.

**Stewart Showing Six-Cylinder Car**—The Stewart Motor Corp., Buffalo, N. Y., which has been making commercial cars exclusively, has started the manufacture of passenger cars and is showing a six-cylinder model for the first time at the Buffalo show this week.

**Crescent Motor Trustee Reports**—Louis J. Huwe, trustee in bankruptcy of the Crescent Motor Co., Carthage, O., has filed a report in the court showing cash on hand, December 20, \$6,177.16 together with the plant and equipment. The plant has been operated by the trustee in bankruptcy.

**Starts Making McNaul Tires**—The McNaul Tire Co., Toledo, O., has completed the installation of its plant on Miami street, and is now manufacturing the McNaul tires there, which, heretofore, were made for its inventor, W. D. McNaul, by one of the tire manufacturing concerns of Akron, O.

**Designing New Gramm Truck**—According to J. N. Garver, representing the Geiger-Jones Co., of Canton, O., which is reorganizing the Gramm Motor Truck Co., of Lima, designers are now at work designing an entirely new motor truck to be manufactured as soon as the reorganization is completed.

**Doubles Its Capital Stock**—The Electrical Motor and Construction Co., Findlay, O., has voted to increase its capital stock from \$15,000 to \$30,000 and to construct at once an addition to its present location, a building 50 by 122 feet, and two stories high. Stock rooms and repair shops will be located on the second floor. The new officers of the company are: F. E. Hurley, president; O. D. Donnell, vice-president; R. J. Berry secretary.

**To Build Light Tractor**—The Utility Steel Tractor Co., organized recently at Antigo, Wis., with \$25,000 capital, is preparing to market a light four-wheel drive tractor designed by N. C. Woodin, formerly chief engineer of the International Hoist Co., of Antigo. The company is negotiating with several commercial associations in Wisconsin and Illinois for a site for the proposed foundry and machine shop group it intends to erect during the course of the present year. D. S. Stewart is president; Mr. Woodin, vice-president, and F. A. Hecker, secretary and treasurer.

**First Rubber Shipment Received**—A trainload of crude rubber, carrying 500 tons of the product in twenty-three cars, arrived in Akron January 22, for the Goodyear Tire and Rubber Co. This marks the first receipt by any American rubber manufacturer of crude rubber from the far east since the embargo was laid by England some time ago. The Goodyear company also has some 500 tons on board the Lusitania, due to arrive within a few days, which will be the second receipted shipment of crude rubber for America since England lifted the embargo. With a plentiful supply of crude rubber now in sight, the lifting of the embargo will probably prevent any advance in prices of tires. Much higher prices would have been inevitable had England insisted upon her position in refusing to permit crude rubber from any of her possessions to be sent to the United States. As it was, the price

of crude rubber per pound practically doubled in the 2 months the embargo was on. Now prices are slipping back to normal.

**Deaco Plant Sold at Auction**—The plant of the bankrupt Detroit Electrical Appliance Co., Detroit, Mich., which made the Deaco starters, has been sold by the Detroit Trust Co., at public auction for \$24,350 to Lipson & Schmidt.

**Remy to Break Ground Soon**—Construction on the new plant of the Remy Electric Co., which is to move to Detroit from Anderson, Ind., will be started in a few days when ground will be broken for the two-story, 50 by 150 foot, engineering building. This is to be the first of the various buildings which will be erected and will cost about \$100,000.

**More Buildings for Shock Absorber Maker**—The business of the Landis Tool Co., Waynesboro, Pa., manufacturing the Landis shock absorber, has shown such a substantial increase during 1914, that the company has decided upon a large expansion. An addition, 100 feet by 100 feet and two stories in height, will be erected to the main shop and a 60 by 40 foot addition will be erected to the foundry building.

**Case Cars to Terrorize Turks**—The J. I. Case company, Racine, Wis., has received a cable order for fifty-five Case cars of various types for delivery to its Russian branch house at Odessa. The cars are for the use of the Russian army in the Turkish field. The Case company has already made large shipments of cars and armored trucks to its European branches for distribution among warring nations.

**Hupp Gives Work to Unemployed**—The Hupp Motor Car Co. has started work on four new buildings, consisting of a new office building two stories high, 1,800 by 300 feet; an engineering building, 200 by 200 feet; a testing laboratory, 350 by 200 feet, and a top and body building, 1,500 by 300 feet. At least \$150,000 will be spent and the work was started at this time instead of in the spring in order to give work to many unemployed men.

**Differential Company Raises Capital**—The offices of the Gearless Differential Co. have been moved from the Penobscot building to 864 Woodward avenue, Detroit, Mich. The capital stock of the company has been increased from \$50,000 to \$75,000. At the annual meeting the following officers were elected: George D. Bailey, president; C. F. Ferguson, vice-president; E. O. Knight, secretary-treasurer. H. H. Bailey, George Stroh, A. MacLaren and John Schrag are the directors.

**Fuel Test for Moreland Trucks**—Fuel economy tests of a most exhaustive nature have just been completed by Chief Tester Claud Botsford of the Moreland Motor Truck Co., Los Angeles, Cal. A novel plan was adopted by Tester Botsford. An ordinary can was fastened to the side of the seat box. The fuel line was disconnected from the regular tank and fastened to the emergency can. The trucks were loaded to their capacity and driven until the limited supply of fuel was totally exhausted. The plan was certain to be accurate and the resulting records were sure to be official. The last truck to be tested was a regular stock ½ ton model. The start was made with a capacity load and the 1-gallon can filled with fuel, and though the drive was made in a steady rain, the com-

pleted results of three trips showed 14 3-10 miles to the gallon of California distillate.

**"All Sold Out," Pullman Claim**—H. W. Hayden, general manager of the Pullman Motor Car Co., York, Pa., states that the output of the factory for the next 12 months is either sold or contracted for.

**Joerns Motor May Move to Racine**—Representatives of the Joerns Motor Mfg. Co. of St. Paul, Minn., visited Racine, Wis., last week to look over the field with a view of removing the works from St. Paul to Racine.

**Rim Company Changes Officers**—At the annual stockholders' meeting of the Universal Rim Co., Chicago, held January 11, the resignations of the former president and treasurer were accepted, and E. K. Baker was elected president.

**Plan Reorganization of Speedwell Company**—At a conference of the stockholders of the Speedwell Motor Co., held at Dayton, O., recently, President Pierce D. Schenck was given authority to effect a reorganization of the company and provide means whereby the company can meet the demands of the business more efficiently. A plan of reorganization is now being worked out.

**Purchases R. C. Wells Mfg. Co.**—The entire business and factory of the R. C. Wells Mfg. Co., Fond du Lac, Wis., producing lighting, starting and ignition systems, has been purchased by Richard H. Mansfield, for 14 years secretary of the Cutler-Hammer Mfg. Co. of Milwaukee, maker of the Vulcan gearshift. Mr. Mansfield retires from the Cutler-Hammer company and has taken charge of the Fond du Lac plant.

**To Specialize on Ford Bodies**—The Ohio Carriage Mfg. Co. of Columbus, O., which purchased the old plant of the Barndt-Johnson Body and Top Co., has installed complete machinery for the manufacture of bodies of all kinds. The company will make bodies for all makes of cars but will specialize on bodies for Ford cars. The company is carrying a large stock of bodies for Ford cars, including limousines, sedan and coupe.

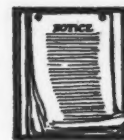
**Starter Company Is Bankrupt**—Six months ago the people of Lacon, Ill., gave F. Walker, president of the Walter Automobile Starter Co., a bonus of \$10,000 to open a factory in that city. The sequel is a petition in bankruptcy. John R. Belsley of Lacon has been appointed trustee and will make an effort to realize as much as possible for the creditors. The bankruptcy hearing is set for this week before Referee E. U. Henry in Peoria.

**New Plant for Davis Company**—The Davis Mfg. Co., Fifteenth avenue and Park street, Milwaukee, gasoline engines and light cars, has awarded all contracts for the erection and equipment of its new manufacturing plant at Fifty-seventh avenue and Mitchell street, in West Allis, Milwaukee county. Foundations were laid some time ago and the work has now been resumed and is to be rushed so that occupancy may be taken in the spring.

**Building Tractor and Delivery Car**—The Homer Motors Co., Los Angeles, Cal., now is manufacturing a motor tractor weighing 4 tons and a light delivery car, capacity 1,000 pounds. The company is financed entirely by Los Angeles capital and is under the management of J. E. Meyer, president; Dr. J. E. Coweles, vice-president; George W. Bishop, secretary; George F. Thompson, treasurer, and J. P. Barker, the inventor, and David Macdonald, directors.



# Brief Business Announcements



**INDIANAPOLIS, Ind.**—The name of the Gibson Automobile Co. has been shortened to the Gibson Co.

**Philadelphia, Pa.**—The corporate name of Gibney Motor Supply Co., pioneer accessory dealer, 217 North Broad street, has been changed to the Gaul, Derr & Shearer Co.

**Milwaukee, Wis.**—W. N. Durbin and W. R. Thomson have formed a company styled Durbin-Thomson Co., Ltd., to act as state of Wisconsin distributor for the Moon. Both have been connected with the motor sales business in Milwaukee for several years.

**Milwaukee, Wis.**—At the annual meeting of the Gas Tank Recharging Co. of Milwaukee, John J. McJeskey was elected president; J. G. Gutzler, secretary, and T. J. Pagels, treasurer. Arrangements are being made for a larger output of acetylene gas so that the growing business of recharging motor car gas tanks may be accommodated.

**Rice Lake, Wis.**—Christian T. Christianson has purchased a half interest in the garage of C. J. Boortz and the firm name has been changed to Boortz & Christianson. New quarters have been opened in the Automatic Trip Carrier factory building on Marshall street. The capacity of the garage is thereby doubled.

**Burlington, Wis.**—The Broome-Bergener-Abe Sales Association has been organized here by George Broome, C. O. Bergener and G. Frank Abe to represent the Ford in this territory and distribute a varied line of articles and devices in Wisconsin, Minnesota and

northern Illinois. Offices have been established in the Kruckmann building.

**Big Rapids, Mich.**—A new garage has been started here by L. F. Bertrau.

**Cleveland, O.**—An additional factory, 100 by 160 feet, is being erected for the Metals Welding Co., next to its present plant.

**Columbus, O.**—The Litter Garage and Machine Works is the name of a new garage and repair shop opened at 792 North High street.

**Mt. Pleasant, Mich.**—Floyd H. Johnson has opened a garage and showroom on West Broadway. He has taken the agency for the Ford for this city and twelve townships of the county.

**St. Joseph, Mo.**—The name of the Selden-Maxwell Co., has been changed to that of Maxwell-Hudson Motor Co., headquarters being at Eleventh and Faraon streets. The Maxwell and Hudson cars are handled.

**Milwaukee, Wis.**—Paul J. Rauschenberger, proprietor of a garage and repair shop at Fifty-sixth street and Grand avenue, has filed a voluntary petition in bankruptcy, scheduling liabilities at \$3,011 and assets at \$4,131.

**Alliance, O.**—The Central Motor Car Co. has been organized by M. E. Biery as general manager to conduct a garage. The company has taken the local agencies for the Republic and Grand trucks and Herff-Brooks.

**Grand Rapids, Mich.**—The Grand Rapids Saxon Co. has been organized to act as distributor for the Saxon cars in this part of

Michigan. William Rae is president of the concern, George A. Sinclair vice-president, and R. A. Wellman, secretary-treasurer.

**Detroit, Mich.**—Charles S. Pope has become a member of the engineering department of the Hupp Motor Car Co.

**Omaha, Neb.**—Trucks only will be handled by the newly organized E. E. Moser Co., which has opened salesrooms at 2218 Farnam street. The Commerce, Denby, Federal and Standard are handled by this company.

**Dayton, O.**—Walter B. Schaeffer, a dealer in motor cars, has filed a petition in voluntary bankruptcy in the United States court, with liabilities scheduled at \$18,438.36 and assets estimated at \$9,648.74. Most of the indebtedness is unsecured.

**Columbus, O.**—The Spring Street Garage, 58 East Spring street, has been taken over by a new partnership known as Merz and O'Brian. Mr. Merz formerly operated a repair shop at 11 East Cherry street. The former owner was Fred Hamilton.

**Davenport, Ia.**—The McGivern Motor Co. has bought out the Wagner Motor Co., and is now distributor for the Mitchell cars in eastern Iowa and Rock Island county, Ill. The Wagner headquarters at 115 Harrison street will be continued.

**Toledo, O.**—The Cornelius-Browning Auto Co. is the name of a new concern which has been organized by R. C. Cornelius and H. B. Browning to take over the business of the Cornelius Auto Sales Co. at 817 Jefferson ave-

**Albany, N. Y.**—The Broadway Auto Co.; capital stock \$5,000; incorporators, Herman Lasky and Henry and Max Lasky.

**Albany, N. Y.**—The Yankee Heavy Oil Motor Co.; capital stock \$50,000; incorporators, George Kelsler, E. J. Dooling and J. A. Clynes.

**Albany, N. Y.**—The Electric Motor Bus Co.; capital stock \$10,000; incorporators E. R. Conklin, S. L. Conklin and H. B. Weaver.

**Albany, N. Y.**—The Reliance A. C. Co., to manufacture tires; capital stock \$1,000,000; incorporators, J. W. Anderson, W. J. Gibb and E. Longe.

**Albany, N. Y.**—The Centre Moriches Garage Centre; capital stock \$5,000; incorporators, H. Josiah S. Robert, J. Sidney Penney and Clarence C. Ross.

**Albany, N. Y.**—The Suncott Motor Sales Co., to deal in accessories; capital stock \$10,000; incorporators are P. A. Sullivan, R. A. Kellogg and D. E. Knowlton.

**Albany, N. Y.**—Garagemens League, Inc., to manufacture supplies and accessories; capital stock \$10,000; incorporators, G. D. Brown, F. W. Lane and L. Gregory.

**Albany, N. Y.**—Dunham & Black, to manufacture accessories and conduct repair station; capital stock \$15,000; incorporators, Allen Black, F. G. Dunham, J. G. Stockham.

**Albany, N. Y.**—The Dujardin Rubber Co., to manufacture tires, tubes and accessories; capital stock \$100,000; incorporators, Henry Dujardin, Frank B. Hutcheon, Frank F. Hutcheon.

**Albany, N. Y.**—The Gillett-Johnson Co., Inc., to deal in motor vehicles, etc.; capital stock \$5,000; incorporators, Frank D. Gillett, Cassie L. G. Johnson, Albert Johnson and James L. Nesbitt.

**Albany, N. Y.**—The Diamond Carburetor Co., to manufacture carburetors and devices, tools and supplies; engines; capital stock \$100,000; incorporators are E. C. Cox, G. B. Read and A. Spindler.

**Albany, N. Y.**—The Brooklyn & Long Island Auto Associated Co., Inc., to manufacture supplies and equipment; capital stock \$20,000; incorporators, Arthur J. Farrell, Charles F. Batt, Robert R. Lumley.

**Augusta, Me.**—Pull-More Motor Truck Co.; capital stock \$500,000; incorporators, E. M. Leavitt and Ernest L. McKean.

**Augusta, Me.**—The Monarch Stitched Tire Co., to manufacture motor car tires and inner tubes; capital stock \$5,000,000; incorporators, Horace Mitchell, H. A. Paul, M. G. Mitchell.

**Augusta, Me.**—The Pull-Motor Truck Co., to manufacture motor vehicles; capital stock \$500,000; incorporators, Ernest L. McKean, M. O. Yeaton, Samuel Titcomb, R. S. Ruzzell,

## Recent Incorporations

L. I. Goodell and E. M. Leavitt, of Winthrop, Maine.

**Brooklyn, N. Y.**—Dean Garage; capital stock \$1,000; incorporators, Frederick L. Johanns, Patrick J. Howard, Chas. E. Fiske.

**Brooklyn, N. Y.**—Williams & Tschanz Auto Co.; capital \$1,000; incorporators, Emile Tschanz, Annie Tschanz and Emma Williams.

**Buffalo, N. Y.**—Simcott Motor Sales Co.; capital \$10,000; incorporators, Daniel E. Knowlton, Ralph A. Kellogg and Philip A. Sullivan.

**Cambridge, Mass.**—Ben Klauer Motor Co.; capital \$5,000.

**Cambridge, Mass.**—Atterbury Boston Co.; capital stock \$25,000.

**Center Moriches, N. Y.**—Center Moriches Garage; capital \$5,000; incorporators, Josiah S. Robert, J. Sidney Penney and Clarence C. Ross.

**Chester, W. Va.**—Chester Rubber Tire & Tube Co., to manufacture rubber goods; capital stock \$2,000,000; incorporators, Philip Freshwater, J. C. Freshwater, Elmer Freshwater, A. L. Skinner and George A. Hasson.

**Cleveland, O.**—The Standard Motor Truck Sales Co.; capital stock \$10,000; incorporator, E. Peterslidge.

**Columbus, O.**—The McGlary Garage Co.; capital stock \$10,000; incorporators, A. O. Clary and others.

**Columbus, O.**—The Portable Garage & Construction Co.; capital stock \$3,000; incorporator, B. H. Thompson.

**Detroit, Mich.**—The Detroit Speedway Club; capital stock \$500,000; incorporators, Philip Breitmeyer, George Fulwell, Arthur E. Gordon.

**Detroit, Mich.**—Pilgrim Motor Co., to manufacture motor cars; capital stock \$2,000.00. Incorporators, C. H. Lute, W. H. Radford, Leonard C. Welford.

**Eddyville, N. Y.**—Gas-Electric Motorbus Corp.; capital \$10,000; incorporators, Roland R. Conklin, Stanley L. Conklin and Harold B. Weaver.

**Grand Rapids, Mich.**—Cornitt-Vanden Bosch Carburetor Co.; capital stock \$50,000.

**Indianapolis, Ind.**—Automatic Lighter Co., to manufacture an automatic lighting device; capital \$10,000; incorporators, George W. Infield, O. J. Boulden and C. E. Haviland.

**Milwaukee, Wis.**—The Wisconsin Automobile Business Association, to promote the interests of motor car, supply and accessory dealers in Wisconsin; incorporators, Oscar F. Fischedick, Roland Mueller, H. Terry Andrae, Jesse A. Smith.

**Mt. Pleasant, Mich.**—Mt. Pleasant Motor Co., to make motor cars; capital stock \$5,000.

**Newark, N. J.**—Gibraltar Tire & Tube Co., to manufacture tires and tubes; capital stock \$100,000; incorporators, H. L. Brown, R. Bradshaw and R. Brown.

**New York, N. Y.**—Regent Garage; capital stock, \$1,000; incorporators, Kathryn Donnelly, John G. Donnelly and Wm. J. Doyle.

**New York, N. Y.**—I. T. Motor Renting Co.; capital \$2,000; incorporators, Harry L. Toomey, Charlotte C. Ingraham and Philip B. Ingraham.

**New York, N. Y.**—Reliance A. C. Co., to manufacture tires, etc.; capital stock \$1,000,000; incorporators, J. W. Anderson, W. J. Gill and E. Long, Brooklyn.

**New York, N. Y.**—National Tireseal Co., to manufacture a compound for sealing tires, etc.; capital \$100,000; incorporators, David Bloch, Geo. W. Lebolt and Sydney Stein.

**New York, N. Y.**—Flaum Shock Absorber Corporation, to manufacture accessories, etc.; capital \$20,000; incorporators, Samuel M. Halper, Julius Flaum and James E. Duros.

**Somerville, Mass.**—Union Square Garage; capital \$5,000.00.

**South Bend, Ind.**—The Lincoln Garage Co.; capital stock \$1,000; incorporators, John W. Cleveland, Cecil B. Cleveland, and Harry Garlanger.

**Springfield, Mass.**—Harrington-Gifford Co.; capital stock \$15,000.

**Trenton, N. J.**—Grove & Stewart, Inc., general motor car business; capital stock \$125,000; incorporators, L. J. Koch, Jr., W. C. Stewart and T. Schimpf.

**Trenton, N. J.**—The Three Star Tire Co., to manufacture tires, tubes, etc.; capital stock \$50,000; incorporators, Edward H. Steel, Archibald F. Updike and Richard G. Whitehead.

**Vernon, B. C.**—The Vernon Central Garage, Inc.; capital stock \$15,000.

**Waco, Tex.**—Willis-Half Co.; capital \$25,000; incorporators, Percy Willis and G. A. C. Half.



nue. The company will act as agent for the Kritt in northern Ohio.

**Delphos, O.**—Papers have been filed with the secretary of state increasing the capital stock of the Mueller Implement and Auto Co. from \$75,000 to \$125,000.

**Bucyrus, O.**—George Kleindienst is planning to erect a two-story garage on South Sandusky street, which will be managed by Wesley Kalb. The garage will take the place of a livery stable.

**Detroit, Mich.**—James Ryan, who during the last 3 years has been representative

in Indianapolis, Ind., for Rayfield carbureters, recently resigned to become associated with the Detroit Lubricator Co., manufacturer of Stewart carbureters.

**Niles, O.**—A deal has been closed whereby the name of the White Front Garage has been changed to the Trumbull Buick Co. Edward Thorpe has purchased a half interest in the business. The company has taken the agency for the Buick in Trumbull county.

**Columbus, O.**—A meeting of representative dealers will be held at Columbus February 4, for the purpose of organizing the Ohio

State Automobile Trades Association. The Columbus Auto Trades Association is back of the movement to organize the state association.

**Milwaukee, Wis.**—The Universal Oxygen Co., Sheboygan, Wis., a large producer of welding and cutting apparatus and tanked gas for such plants, has purchased the business and shop of the Wisconsin Welding and Cutting Co., 167 Barclay street, Milwaukee. The shop is to be enlarged at once. The Wisconsin company featured motor car repair work and this policy will be unchanged under the new regime.

## Recent Agencies Appointed by Motor Car Manufacturers

### PASSENGER CARS

Town	Agent	Make
Allegan, Mich.	W. W. Vosburgh	Dodge
Amenia, N. Y.	Amenia Garage	Saxon
Arbuckle, Calif.	A. J. Atran	Kissel
Baltimore, Md.	Randall Mfg. Co.	King
Battle Creek, Mich.	Frank Palmer	Saxon
Battle Creek, Mich.	Frank Palmer	Saxon
Bellevue, Mich.	Frank Clark	Ford
Blackfoot, Ida.	E. & G. Bills Auto Co.	King
Boston, Mass.	William Hilliard	Pathfinder
Boston, Mass.	R. W. Vining	Oakland
Camden, Maine	W. C. Howe	Kissel
Casco, Me.	G. T. Cook and Myron J. Hall	Maxwell
Ceres, N. Y.	Raymond & Lamphere	Detroit
Charlotte, N. C.	A. Burwell	King
Clare, Mich.	Kelley & Ballard	Saxon
Clermont, Pa.	J. M. Dunsmore	Detroit
Cleveland, O.	Homer D. Haupt	Ohio Electric
Cleveland, O.	Empire Briscoe Co.	Briscoe
Cleveland, O.	Empire Briscoe Co.	Empire
Cleveland, O.	J. H. Greenwald	Chalmers
Cleveland, O.	J. H. Greenwald	Jeffery
Cleveland, O.	Cuyahoga Sales Co.	Chandler
Cleveland, O.	Richardson Motor Car Co.	Cole
Cleveland, O.	Lucas & Christenson	Paige
Cleveland, O.	Lucas & Christenson	Detroit
Cleveland, O.	Vellie Motor Car Co.	Vellie
Cleveland, O.	Vellie Motor Car Co.	Maxwell
Cleveland, O.	The Forest City Garage Co.	Krit
Cleveland, O.	Dunham Motor Car Co.	King
Cleveland, O.	Dunham Motor Car Co.	Meon
Charlevoix, Mich.	Benjamin Brown	Saxon
Clifton Springs, N. Y.	Clarence L. Bailey	Franklin
Colfax, Wash.	S. E. Hunt	Reo
Crawfordsville, Ind.	Arnold, Hill & Turpin	Saxon
Davenport, Ia.	McGivern Motor Co.	Mitchell
Davison, Mich.	E. W. Jones	Ford
Dayton, O.	W. C. Wampler	King
Denver, Colo.	Mid West Auto Sales Co.	King
Detroit, Mich.	Foster Motor Sales Co.	Briscoe
Detroit, Mich.	Foster Motor Sales Co.	Argo
Detroit, Mich.	Foster Motor Sales Co.	Briscoe
Detroit, Mich.	Foster Motor Sales Co.	Argo
Dickson, N. Dak.	The Dickson Motor Car Co.	Franklin
Dowagiac, Mich.	L. C. Wells	Overland
East Auburn, Calif.	Calusa Co. Garage	Kissel
East Burke, Vt.	F. M. Davis	Detroit
Easton, Me.	Kneeland Bros.	Detroit
Elliotville, N. Y.	J. E. Doolittle	Detroit
Elmira, N. Y.	Fred M. Jones	Franklin
Elmira, N. Y.	J. Bruce Gishop	Detroit
El Paso, Tex.	J. Edward Sullivan	King
Farnham, N. Y.	C. J. Peters	Detroit
Galveston, Tex.	Charles Newding	Saxon
Grand Rapids, Mich.	Grand Rapids Saxon Co.	Saxon
Independence, Kans.	R. A. Stone	Oldsmobile
Jackson, Mich.	W. T. Murray	Saxon
Kalamazoo, Mich.	W. O. Harlow	King
Kansas City, Mo.	White Motors Co.	Stearns
Kansas City, Mo.	Karshner Motor Car Co.	King
Kenoza Lake, N. Y.	Thiess & DeLap	Saxon
Knoxville, Tenn.	Kuhlman Motor Sales Co.	Franklin
Lafayette, Ind.	Columbia Tire & Auto Co.	Saxon
Lanesboro, Minn.	J. G. McMaster	Kissel
Latah, Wash.	The Farmers Union Grain & Supply Co.	Reo
Lebanon, N. H.	Bagley & Plamondon	Saxon

Town	Agent	Make
Lexington, S. C.	Alfred J. Fox	Saxon
Livonia, N. Y.	Scott W. Crane	Detroit
Los Angeles, Calif.	English Motor Car Co.	King
Ludington, Mich.	Cartier Auto & Garage Co.	Saxon
Madison, Wis.	Madison Motor Car Co.	Dodge
Marquette, Mich.	Art. Cullen	Dodge
Markesan, Wis.	W. H. Wilson	Kissel
Marysville, Calif.	Marysville Garage	Kissel
Middleport, N. Y.	F. A. Whittaker	Detroit
Mildmay, Ont.	Hunstein & Reuber	Saxon
Milwaukee, Wis.	Milwaukee Motor Sales Co.	Stanley
Milwaukee, Wis.	Milwaukee Motor Sales Co.	Detroit
Milwaukee, Wis.	Hughes Motor Car Co.	Marmon
Monsey, N. Y.	Clayton A. Johnson	Saxon
Montreal, Que.	M. R. Victor	Westcott
Montreal, Que.	Comet Motor Car Co., Ltd.	Regal
Montreal, Que.	Canadian Distributing Co.	King
Morrison, Ill.	O. Woods	Franklin
Morristown, N. J.	Cain-Henry Motor Car Co.	Oldsmobile
Mt. Pleasant, Mich.	Floyd H. Johnson	Ford
N. Adams, Mass.	Anson S. Williams	Saxon
Newark, N. J.	C. F. Briggs Co.	Kissel
New Lexington, O.	C. C. Dillow & Son	Bulck
New London, Conn.	J. B. Getchell	Oldsmobile
New Rochelle, N. Y.	Tracy Rochfeld	Saxon
New York, N. Y.	Isotta Fraschini Motor Co.	Scripps-Booth
Oklahoma City, Okla.	Stapleton Motor Sales Co.	King
Omaha, Neb.	E. E. Moser Co.	Commerce
Omaha, Neb.	E. E. Moser Co.	Denby
Omaha, Neb.	E. E. Moser Co.	Federal
Omaha, Neb.	E. E. Moser Co.	Standard
Perry, Mich.	Dunning & Hart	Dodge
Philadelphia, Pa.	Gibson Auto Works	Briscoe
Philadelphia, Pa.	Ideal Motor Car Co.	Briscoe
Port Huron, Mich.	Frank S. Church	King
Portland, Ore.	Gerlinger Motor Car Co.	King
Poughkeepsie, N. Y.	C. C. Andrews	Detroit
Riverside, Calif.	Fairmount Garage	Kissel
Rhinebeck, N. Y.	Turton & Snyder	Saxon
Rock River, Wyo.	J. C. Schork	Oldsmobile
Scranton, Pa.	Lackawanna Automobile Co.	Saxon
Seneca Falls, N. Y.	O. E. & E. J. Riegel	Kissel
Silver Creek, N. Y.	F. B. Porter	Detroit
Spangler, Pa.	Saxon Sales Co.	Saxon
Sparta, Wis.	Geo. Mannel	Kissel
Sprague, Wash.	W. A. Buckley	Reo
Spokane, Wash.	Moylan & Reilly Auto Co.	King
Springfield, O.	P. T. Rathbun	King
St. John, Ida.	R. B. Gaines	Reo
Syracuse, N. Y.	Shaw & Sissons	Saxon
Tiffin, O.	K. Ralph Summers	Saxon
Toledo, Ia.	Jones Bros. Auto Co.	Franklin
Toledo, O.	Litchie Auto Co.	King
Toledo, O.	Guy R. Ford	Saxon
Toledo, O.	Litchie Auto Co.	King
Toronto, Can.	Canadian Distributing Co.	King
Towanda, Pa.	W. E. Dayton	Kissel
Twin Falls, Ida.	F. A. Nelson	King
Utica, N. Y.	Henry & Morris	Detroit
Vancouver, B. C., Can.	A. S. French Auto Co., Ltd.	King
Walla Walla, Wash.	Moore Auto & Supply Co.	King
Wapakoneta, O.	F. M. Bowers	Maxwell
Waterloo, N. Y.	Iroquois Garage	Detroit
Wilmington, Del.	Postles Auto Brokerage Co.	King
Woburn, Mass.	J. H. Bates & Son	Overland

### COMMERCIAL CARS

Town	Agent	Make
Louisville, Ky.	P. M. Andriot & Sons	Republic

Town	Agent	Make
Louisville, Ky.	Louisville Auto Exchange	United States

# The Motor Car Repair Shop

THESE are the days when the motorist has the greatest trouble in starting his engine after it has been standing in the cold for some time. The fuel does not vaporize as well until the engine gets heated up, and the oil is more viscous.

Rather than exhaust the storage battery by repeated use of the electric starter without causing the engine to fire, the system should be inspected carefully, for even in cold weather the engine should pick up after a reasonable amount of cranking. It may be that the carbureter is out of adjustment for the cold atmosphere or that an electric terminal is loose. At any rate, there is nothing worse than to have to spin by hand a cold motor on a freezing day. Remember this, and conserve the battery.

It often is an effective way to aid vaporization in cold weather to wrap the intake manifold and carbureter body with cloths which have been dipped in hot water. Be sure that all gasoline is carefully strained through chamois so that no water will get into the system. This would freeze and clog in the gasoline line or carbureter nozzle or fuel valve.

Injecting raw gasoline into the cylinders through the pet cocks will do no harm, and is probably the most effective starting agent for a balky engine which has no other malady than being cold. It generally is advisable to use lighter oils in winter than in summer. They flow more freely and are less viscous in the lower temperatures.

Hood covers are an excellent thing for winter driving. They help to keep the motor warm by holding in the heat. Most of them have front sections which go over the radiator. Do not forget to raise the front flap except on very cold days, as ordinarily the motor will heat the water so much that some circulation of air through the radiator is necessary to prevent undue water temperature. Very cold days however, require no air circulation to give all the cooling necessary, and the front flap under such conditions well may be left down.

## Keep the Motor Clean

If you go into the engine room of the average large factory, you will find everything spotless. The brass of the big steam engines and the railings will be polished to a finish, and the floors will look as if they are scrubbed several times a day. The heads of the plant will not have it any other way, and the engineer realizes that if he is to keep everything in the best of running condition, he must have all oil and dirt wiped away immediately. Dust would soon settle where oil was spilled, and in a short time a gummy mass would re-

## Cold Weather Suggestions

sult. Allowing oil spots to accumulate, the surfaces of the big turbines or steam engines or generators would soon become greasy, and this in time would tend to get into the lubricating oil, into the bearings and other contact surfaces.

The car owner should regard his engine and its surrounding parts as the power plant of his small factory on wheels, and if he would get best efficiency, should keep it polished and cleaned just as the stationary engineer would maintain his big power plant. It takes so little extra time to wipe off spilled oil or grit and the advantages are so great from this little matter of care that it seems almost unbelievable. One can usually tell whether the owner has had any experience with other power machinery by the appearance of the motor in his car. If it is gummy and dirty, it is safe to say that he has had little previous contact with the operation of machinery.

It is surprising how quickly the cylinders will become coated with a gummy substance, composed of oil, grease and mud, if they are not wiped off occasionally. The careless driver will some day find that his gummy and dirty magneto will not work; his carbureter may become clogged, or his oil lines get stopped up. Better to make good use of old rags or waste on the mechanism of the steel that serves you so well, than to wait until something goes wrong through dirt and grease. The annoyance you will save yourself is well worth the effort.

A good plan is to take the car to a garage occasionally and have the whole mechanism cleaned. Several large cities have garages which make a specialty of "laundering" motors. They use either a

jet of steam which when directed against the parts cuts the dirt, or a gasoline spray. Some employ gasoline or a weak solution of caustic soda. Any of the above will make the engine spotless, and is well worth the \$1 usually charged.

## Holding the Gasoline Pressure

Those motorists who have cars equipped with pressure gasoline feed from a rear supply tank will appreciate the predicament in which a member of the engineering staff of the Packard company found himself one night when, on returning to his car after leaving it standing at the curb for some time, discovered that a practical joker had stolen the filler cap from the gasoline tank. This relieved the air pressure which the engine had built up, and there was no way of forcing the gasoline to the carbureter except by means of an improvised gravity feed which would mean interference with the fuel pipe.

The Packard house organ explains with considerable pride the solution which its engineer made of the perplexing problem. Fig. 1 shows the scheme which was devised for holding the pressure temporarily so that the car could be driven to the garage. Securing one of the hub caps C, he placed it over the mouth of the gasoline tank G, using a rubber envelope E, which would under ordinary circumstances serve as the case for a spare inner tube, as a gasket, so as to get a tight joint.

In order to hold this improvised cap down securely onto the tank mouth, he pried loose from its hinges a tool box lid L, and used it as a distance piece between the back edge of the tonneau T and the jack J, the latter resting on the hub cap. With this stiff-arm arrangement he was able to force the cap down securely onto the tank mouth by using the jack. To steady the jack and the box lid, a grease can Y was slipped between them and the spare tires W. This outfit served to hold the pressure, and the driver had no trouble in getting home.

The motorist often is confronted with a temporary repair problem on the road, most of them being simpler of solution than this one, but it serves to illustrate how resourcefulness often saves the car driver a long walk. In this case, several folds of cloth would probably have served as well as the rubber envelope as a gasket and a piece of board which might be handy would save the prying off of a tool box lid. Or perhaps the head of the jack could be rested against some other solid surface. The scheme admits of several modifications, but the principle is one which the driver of a pressure-feed car would do well to remember, especially if long trips are made frequently.

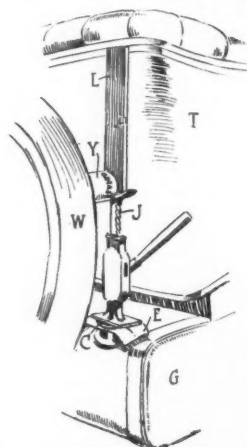


Fig. 1—How a Packard owner retained pressure in the gasoline tank, the filler cap of which had been stolen. A hub cap was made to cover the filler cap hole





## Five Tests—Five World Records

We equipped five stock cars with the new Stromberg Carburetors and out of five tests made five wonderful records, each one being a world's record for the type of car used.

### Jeffery Six

In an official test this car, which, with five passengers, weighed 4,100 pounds, equipped with a New Stromberg Carburetor, made the remarkable record of 28.7 miles on one gallon of gasoline, or 58.8 ton miles.

### Overland 80

Carrying five passengers, total weight 3,930 pounds, this car, equipped with a New Stromberg Carburetor, in an official A. A. A. test with one gallon of gasoline went 29 miles, or 56.9 ton miles.

### Haynes Light Six

Equipped with new model Stromberg, demonstrated its power in the Pittsburgh hill district when it climbed hills on high. With the car and passengers weighing 4,390 lbs., running from 2 M. P. H. in high gear, it was speeded up to 42 M. P. H. in 200 feet.

### Cole Touring Car

Four cylinder stock car carrying seven passengers which, with the car weighing 4,390 pounds and being equipped with a new model Stromberg, traveled 24.135 miles on one gallon of gasoline. In a thirty minute speed test this car averaged 55.63 miles per hour.

### Speed Test on Marmon

The wonderful test made on the Marmon Model 41 at Indianapolis was made possible by the fact that the car was Stromberg equipped. In this speed test the car with top and wind shield up, carrying five passengers, made the remarkable record of 62.89 miles in sixty minutes.

The New Stromberg eliminates the delays and vexations of hard starting and gives you that satisfaction and pleasure resulting from perfect operation under all weather conditions.

What it has done on other cars it can do on yours.

Write, giving us the name and model of your car, and we will tell you which New Stromberg will give you the best service.

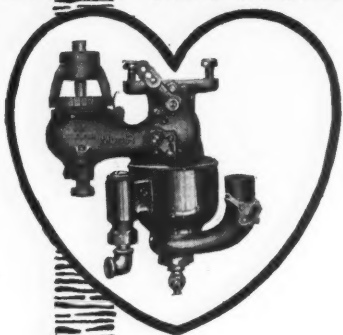
**Stromberg Motor Devices Co., 68 East 25th St., Chicago, Ill.**

# NEW STROMBERG DOES IT

## America's Champion Road Racing Carburetor

# SCHEBLER

*The Heart of the Automobile*



SCHEBLER has won more official road races in the last ten years than any other American carburetor.

The Stutz—first among American road racing cars—winner in the last four years of 30 places out of 38 entries—has been equipped with the SCHEBLER Carburetor in every road race entered.

The National—second only to Stutz in road racing honors and winner of 26 places out of 37 entries—won all its races equipped with the SCHEBLER Carburetor.

The Buick—with the third largest number of road racing victories to its credit—30 places out of 49 entries—was invariably SCHEBLER equipped.

The SCHEBLER Carburetor is maintaining the lead today that it has held consistently throughout the last ten years. SCHEBLER has won every road race held thus far this year—Earl Cooper's SCHEBLER-Equipped Stutz taking first place in the San Diego Exposition 305-mile road race—and Dick Clarke winning the Tucson 102-mile event.

Nothing proves the EVERYDAY WORTH of a carburetor—the ability to stand up under most adverse service conditions—more certainly than road racing. SCHEBLER carburetors stand the gaff! Demand a SCHEBLER on your new car.

**WHEELER & SCHEBLER**  
INDIANAPOLIS INDIANA

*See Us at The Chicago Show,  
Coliseum Gallery, Space 22*



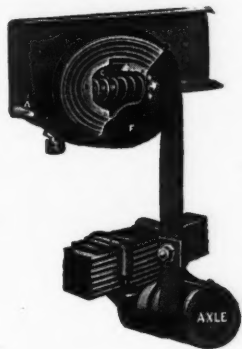
When Writing to Advertisers, Please Mention Motor Age.



# GABRIEL SNUBBERS

## Do You Realize

that the reason a car rides easiest when overloaded is because the overweight prevents excessive rebound of the springs?



This Snubber weighs only 2½ pounds; but a set of four makes your car with

One Occupant ride as easy as if it carried

Six Occupants weighing 800 pounds more.

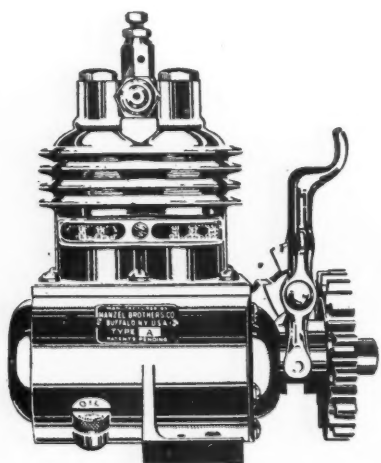
## Snubbers Prevent

excessive rebound of the springs, no matter how light the load. Their action is **automatic** and varies directly in proportion to the severity of the shock to which the springs are subjected. They ensure practically the same easy riding on rough roads as on smooth roads.

*Send for Catalog*

**Gabriel Horn Mfg. Co., 1415 E. 40th St., Cleveland, Ohio**

## Installation is a Very Simple Matter



**T**HE Manzel Two-Cylinder Engine-Driven Pump can be installed without the assistance of a mechanic—a screwdriver, a file and a wrench—these are all the tools necessary.

To inflate the tire attach the hose to the tire valve, throw the pump gears into mesh, and in 3 minutes the tire is inflated to its pressure limit, when the safety valve, that is a distinctive feature of the Manzel pump, cuts off the supply, preventing over-inflation.

**MANZEL**  
ENGINE DRIVEN TIRE PUMP

And your tires get pure air, too—filter screen strains out all grit, dust and foreign matter.

First cost is the only cost—we furnish all fittings complete.

The Manzel pump is not made to meet a price, but it costs you less than any other pump that can be compared with it in quality, simplicity and service.

It is a perfect unit—accurately machined, built like an engine.

And it is a two-cylinder pump—a pump that doesn't rack your car while in use.

It costs only \$20.

Buy it from your dealer. If he doesn't have the Manzel pump in stock order direct from us.

**We carry in stock Fittings for the following cars:**

Abbott-Detroit, Buick, Cadillac, Cartecar, Case, Chandler Six, Chalmers, Cole, E.M.F., Franklin, Hudson, Imperial Six, Kissel Kar, Maxwell, Michigan, Mitchell, Oakland, Oldsmobile, Overland, Packard, Paige-Detroit, Rambler Cross Country, Reo, Simplex, Speedwell, Studebaker, Stutz, Velie and others.

## MANZEL BROS. CO.

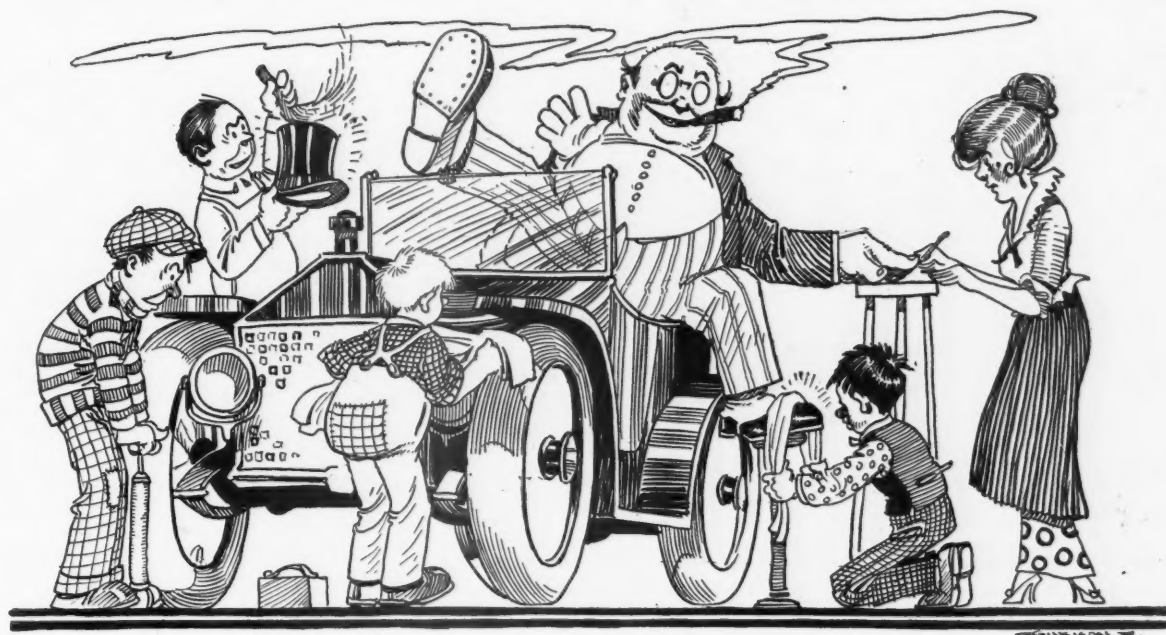
*Leaders, for 16 Years, in the Manufacture of Quality Oil Pumps for Heavy Duty Steam and Gas Engines*

Factory and General Sales Offices

303 Babcock St., Buffalo, N. Y.

DISTRIBUTORS IN ALL IMPORTANT CENTERS





## Some Service!

Whaddayamean service?

There's more than one kind, sure.

Some you pay for and get.

Some you pay for and don't get.

Some you get with what you buy at the time you buy it.

Some you get after you buy a thing—without additional cost. That's Willard service.

When you buy a car equipped with a Willard storage battery our obligation to you has only begun.

If you have battery troubles, you needn't hunt up your car manufacturer or his agent—see us.

There's a Willard service station very near to you, no matter where you are. That's the place to go for service. Then you know that your work is done by men who know Willard batteries.

As a result your battery lasts longer and works better. Your satisfaction means our business. Have you tried it?

### Willard Storage Battery Company

Cleveland, Ohio

NEW YORK: 228-30 W. 58th St.

DETROIT: 736-40 Woodward Ave.

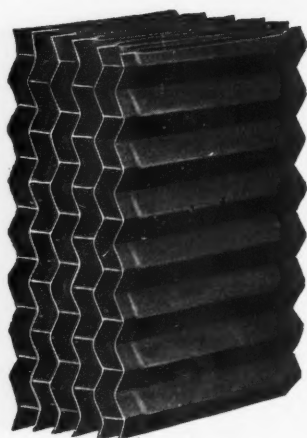
CHICAGO: 2524-30 S. Wabash Ave.

SAN FRANCISCO: 821 Monadnock Bldg.

INDIANAPOLIS: 318 North Illinois Street

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO.





## LOOK CAREFULLY

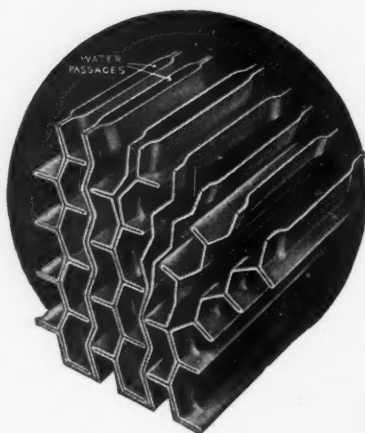
AT THESE ILLUSTRATIONS

STUDY THEM attentively for a few moments—it means much to you.

RADIATOR TROUBLE is one of the "bugbears" of the motorist, but the novel construction of the

## NATIONAL RADIATOR

In place of the usual system of individual tubes, the NATIONAL RADIATOR is built up of continuous bands of tough corrugated brass, giving enormous strength with wider air spaces and greatly enhanced cooling power.



entirely revolutionizes all previous ideas of radiator efficiency.

ALL NATIONAL RADIATORS are tested at not less than fifteen pounds air pressure under water.

The continuous unit construction is a natural shock absorber—the jars and vibration of the road cannot pull the joints apart—hence the radiator will not leak and its life is greatly prolonged.

### REMEMBER—

Greater cooling power—Continuous unit construction—Enormous strength—Lifelong endurance—Less weight.

*Your Car Needs a National*



**THE NATIONAL CAN COMPANY, Detroit, Mich.**









# CHANDLER SIX

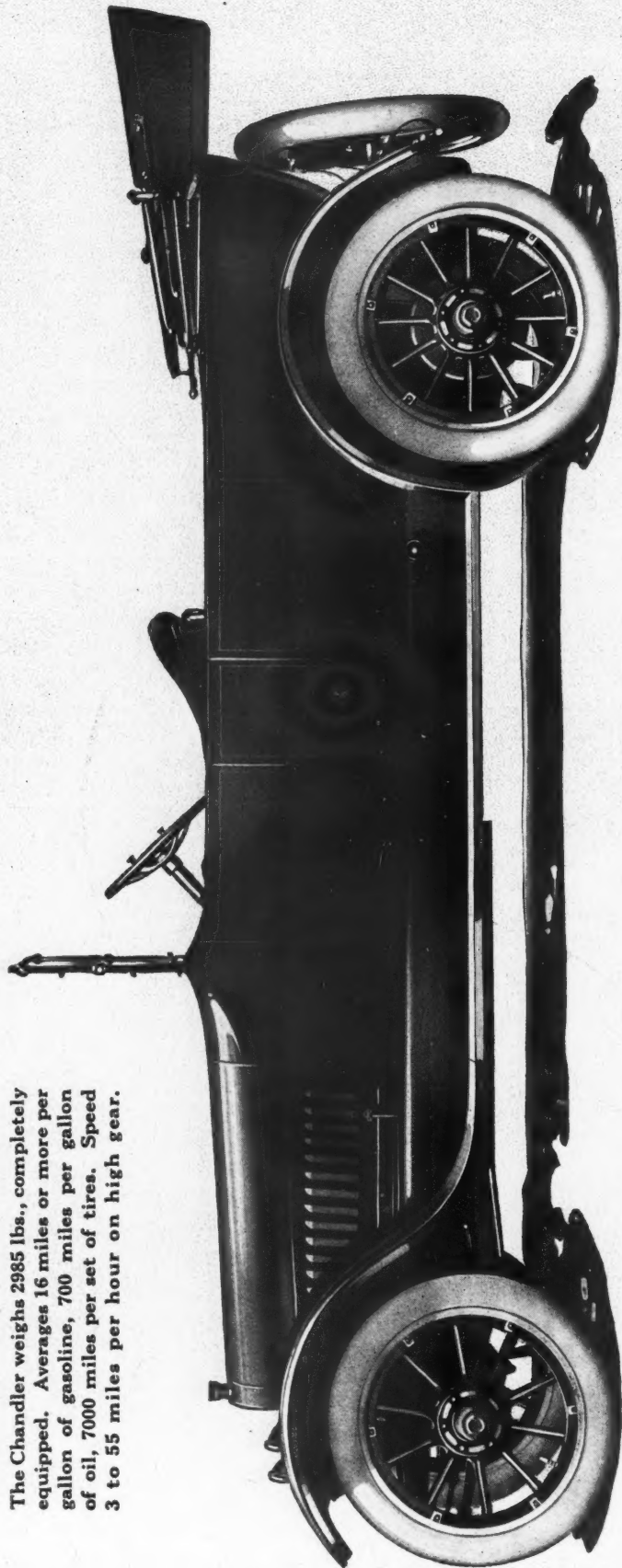
*The Pioneer Light-Weight Six*

**\$1295**

The only six of standard size  
at less than \$1300

# "The Six with the Marvelous Motor"

The Chandler weighs 2985 lbs., completely equipped. Averages 16 miles or more per gallon of gasoline, 700 miles per gallon of oil, 7000 miles per set of tires. Speed 3 to 55 miles per hour on high gear.



**WE NAMED** this car the Chandler. But Chandler owners have christened it "The Six with the Marvelous Motor." These thousands of Chandler owners are in a position to know. Their experience has pointed out to us our greatest selling point: the distinctive superiority of the Chandler motor.



## Dealers, What Other Car Offers You Half the Opportunity?

No other car does. The Chandler at the new price is the top-value, low-price car by such long odds that there are no possible comparisons.

In the excellence of its marvelous six-cylinder motor, in workmanship and finish throughout the whole car, in every item of design, construction and equipment, it leads all sixes under the \$2000 mark. And we firmly believe that a *better* six was never sold at *any* price.

You remember that the Chandler at \$1785 two years ago was a sensation.

Last year at \$1595 it was again a sensation.

And here it is now for \$1295. Think of it, for \$1295!

For the new season we are continuing the same model that broke sales records at \$1595. What could we have done to improve it? Not a thing. And we continue it at a new price lower than the price of any other standard-size six; hundreds of dollars lower than any other six that really competes with it in quality.

It is impossible to think of any other sales opportunity that is in the same class with this.

## How Can Chandler Do It?

With similar cars selling from two hundred to five hundred dollars higher than the Chandler, you ask how we can do it. The Chandler has made money from the day that *first* of the light sixes took the road. The Chandler has pointed the way every step of the way. And now, with maximum production, with an overhead expense so small that it astounds other manufacturers, with no old loads to carry and no old scores to wipe out, and with our working capital of *real money*, we are able to set the new price at a figure so low as to establish the Chandler in a position of leadership that *must stand unchallenged*.

## Every Feature That Has Made the Chandler Famous Is Retained

At this new price, the pioneer Chandler retains absolutely every feature of construction and quality that has made it the leader of all light sixes. You will find all these features on the Chandler, and *not* on any other six selling for less than \$2,000..

Bosch magneto.

Gray & Davis electric starting motor.

Gray & Davis electric generator.

Enclosed silent chains for driving motor shafts.

Bosch spark plugs.

Mayo genuine Mercedes type radiator.

Cast aluminum motor base extending solidly from frame to frame, giving rigidity to engine mounting; providing pedestals cast integral for magneto, pump and generator; and obviating necessity for dirty, rattly sheet metal drip pan.

Rayfield carburetor.

Worm-bevel rear axle.

Imported annular ball bearings throughout.

Oiling system completely contained within the motor; no outside piping.

Genuine hand-buffed leather (not machine buffed, split or imitation).

Luxurious stream line body, with clean running boards.

Golde patent one-man top, with Jiffy curtains.

Large gasoline tank carried in rear.

Firestone demountable rims.

All the usual incidental equipment.

And the Marvelous Chandler Motor Built in Our Own Factory.

---

**Five and Seven-Passenger  
Bodies, \$1295**

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**CHANDLER MOTOR CAR COMPANY**

201-231 E. 131st St., CLEVELAND, OHIO

New York City Office:  
245 W. 55th St.

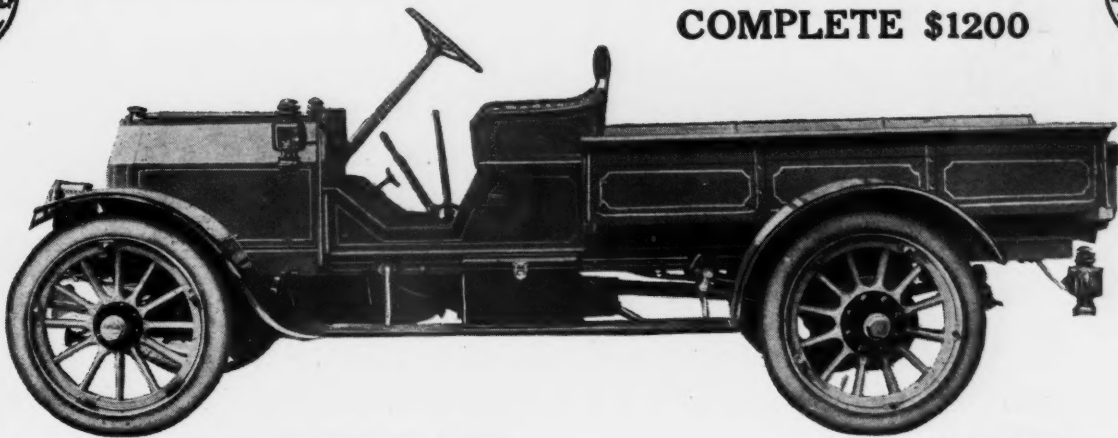
Cable Address:  
Chanmotor











COMPLETE \$1200

Model A-3—1500 Lbs. Capacity  
With Express or Stake Body

CHASSIS ONLY  
\$1125

## "The MENOMINEE" TRUCKS

FOR ECONOMY

Every class of truck user is individually catered to by one of the three distinctive models of the economical "MENOMINEE."

Light (1,500 lbs.), medium (1-ton), and heavy (1½-ton), "MENOMINEES" furnish rapid, economical delivery for department stores, grocery stores, meat markets, transfer companies, expressmen, dairymen, brewers, wholesale manufacturers, etc.

Easy to drive, impossible to tire out, quick to reach their destination, and on the job 365 days of the year—are some of the reasons for the success and popularity of the three MENOMINEE TRUCK models.

### No Limit to the Possibilities for "The Menominee":— Note the Sizes and Prices

Model A-3, 1,500-pound Capacity Chassis, \$1,125—  
Complete With Express or Stake Body, \$1,200.

Model B-3, 2,000-pound Capacity Chassis, \$1,400—  
Complete With Express or Stake Body, \$1,500.

Model C, 3,000-pound Capacity Chassis, \$1,800—  
Complete With Express or Stake Body, \$1,950.

**Dealers**—There are prospects by the dozen in every territory, men who need motor trucks, and only want to be shown.

**MENOMINEE DEALERS** are equipped with the goods that make these sales—the right weight truck, at the right price.

Write us now. Let us tell you how we'll help you make your profits. It's good, live money for you. Use the coupon today.

**D. F. POYER COMPANY**  
Menominee, Michigan



(COUPON)  
D. F. POYER CO., Menominee, Mich.  
Gentlemen: I am interested in "THE MENOMINEE" Motor Truck. Kindly send me complete information.  
Name .....  
Address .....  
It a dealer check here. ☐



"Jeffery at \$5,000 could not add a single feature, of real value to the owner, to the Chesterfield Six which you now sell at \$1,650." A prominent Jeffery dealer in one of the large cities made this remark after giving himself a demonstration of the Jeffery Chesterfield Six Touring car.

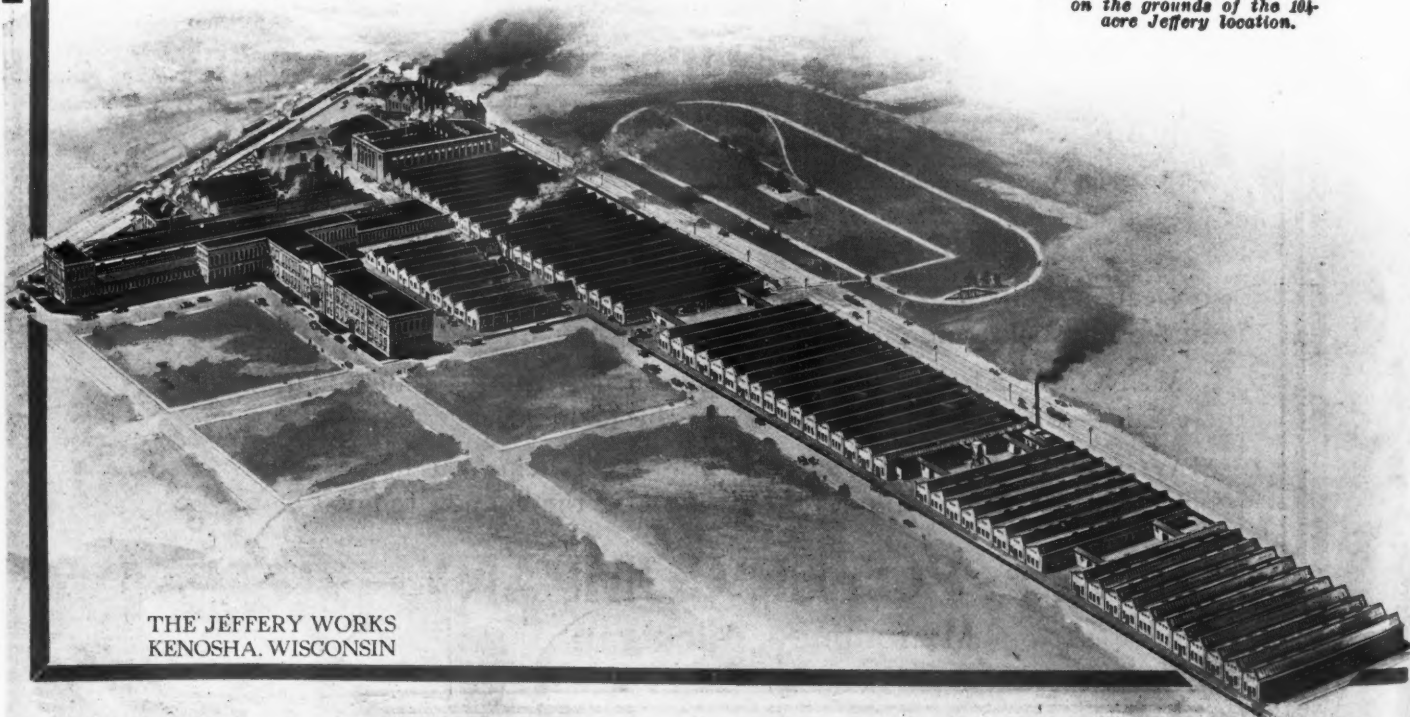
Engineers who know the most minute details of automobile specifications, strength of steel, balance of weight, proportion of power, and high excellence of equipment instinctively place the Jeffery along side of cars that sell for double the price.

Owners who appreciate real distinction in appearance, who know what genuine comfort is, and who demand that their motor cars shall not suffer by comparison with any other automobile built, are turning to the Jeffery in both the Chesterfield Six and Big Six models.

Dealers who stake the success of their business on the cars they represent, who demand stability and a proven record of manufacturing success, are in a very great number of cases devoting their time and efforts exclusively to the Jeffery.

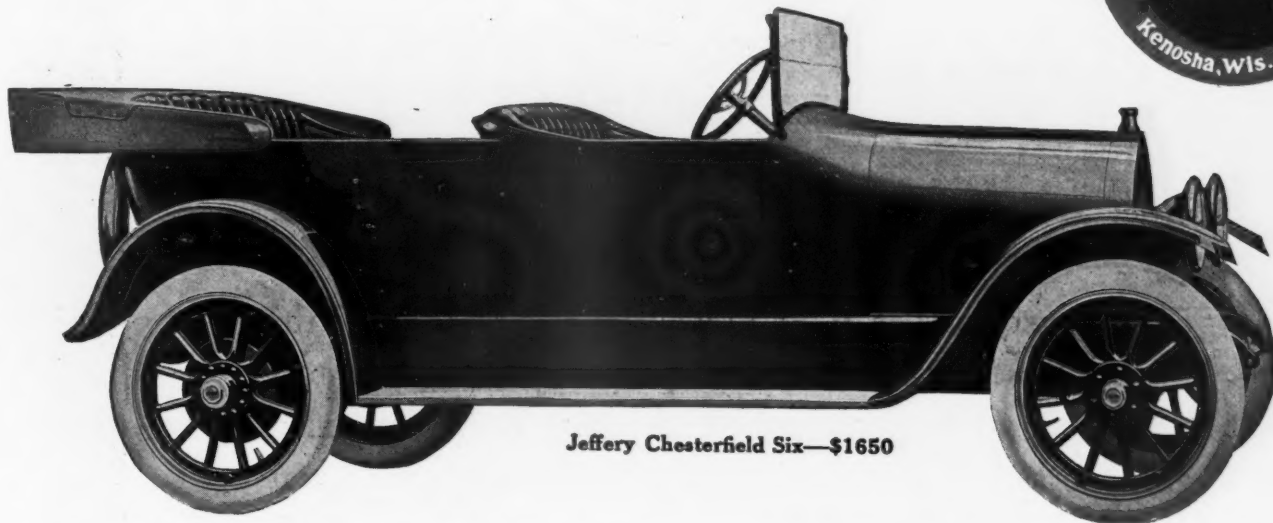
Jeffery was the first to use the small, high-speed, high-efficiency motor—now standard among all successful motor car manufacturers. Jeffery introduced worm drive into gasoline pleasure car construction in America. Jeffery cantilever spring suspension, the only type that makes the rear seat ride with even greater comfort than the front, has been extensively copied by all manufacturers who seek to offer riding luxury as a feature of their car.

25 acres of the most advanced automobile building machinery on the grounds of the 104-acre Jeffery location.



THE JEFFERY WORKS  
KENOSHA, WISCONSIN





Jeffery Chesterfield Six—\$1650

**M**EN of the highest financial rating, in most cases ranking first in business standing in their communities make up the personnel of Jeffery dealers. They are united in their opinion regarding the Jeffery Chesterfield Six.

"Chesterfield arrived Saturday evening. Have had no rest since. Have been obliged to keep store open Sunday to accommodate customers. Sold three cars first two hours. Jeffery Chesterfield Six is absolutely the greatest car I have ever driven."

CENTAUR MOTOR CAR CO., Chicago, Ill.

"The Jeffery 'Chesterfield Six' looks like ready money. It is without doubt the most perfect automobile we have yet seen, which is all very pleasing."

POERTNER MOTOR CAR COMPANY,  
New York, N. Y.

"It is by all odds the classiest light Six on the market and we believe superior in value by two hundred and fifty dollars to any of its competitors."

CARLTON-FAULKNER-BOWLES, Inc.,  
Los Angeles, Calif.

"It is a style carriage from tip to stern. All you have to do is to look at it and rave about it."

THE DES MOINES JEFFERY CO.,  
Des Moines, Ia.

"The Chesterfield is the prettiest car in this market. The riding and controlling is wonderful and almost any child ten years old can drive a Chesterfield Car."

JEFFERY MOTOR SALES CO.,  
St. Louis, Mo.

"We have been surprised at the great attention to detail. Even now we are discovering additional talking points. On the whole this car is the best thing we have ever seen and its power on hills and through sand is remarkable."

McARTHUR BROTHERS, Phoenix, Ariz.

"The Chesterfield is the sweetest running thing on four wheels. We just unloaded the cars last evening and today, the first good weather here in ten days, we paraded the streets with the cars."

BURROWS AUTO CO., Ogden, Utah.

"We drove our Chesterfield Six up from Kenosha Saturday evening in one hour and twenty minutes. The roads are very bad in some places owing to repairs and recent rains, yet we were never bumped out of the seats. Its riding qualities are remarkable."

REEKE-OSMOND MOTOR CAR CO.,  
Milwaukee, Wis.

"This is so far as we can find the first high grade six cylinder car to be sold at a moderate price. From now on we believe that it is simply going to be a question of being able to make deliveries."

P. J. DOWNES CO., Minneapolis, Minn.

"Please hurry up shipments of more cars. I might add that I have placed five Jeffery cars in my territory during the past month."

JAS. F. PIPER CO., Sacramento, Calif.

**The Thomas B. Jeffery Company**  
Main Office and Works, Kenosha, Wisconsin

**REGAL**

## *The New Regal Line*

TO every dealer who visits the Chicago Show this week—to every dealer everywhere—in any territory where we are not represented, the new Regal line offers an opportunity never before presented by any one manufacturer. It includes three distinct models—the sensations of the motor world for this season.

### A NEW EIGHT

with stream-line five passenger body,  
completely equipped, retailing at . . . **\$1250**

### A STANDARD FOUR

with stream-line five passenger body,  
completely equipped, retailing at . . . **\$1085**

### A LIGHT FOUR

with equally handsome stream-line  
body, completely equipped, retailing at **\$650**

Contracts will now be made for these cars in any open territory, with dealers of recognized energy, ability and rating. Correspondence invited but immediate action by wire or personal visit to factory is advised.

REGAL MOTOR CAR COMPANY  
Detroit, Michigan



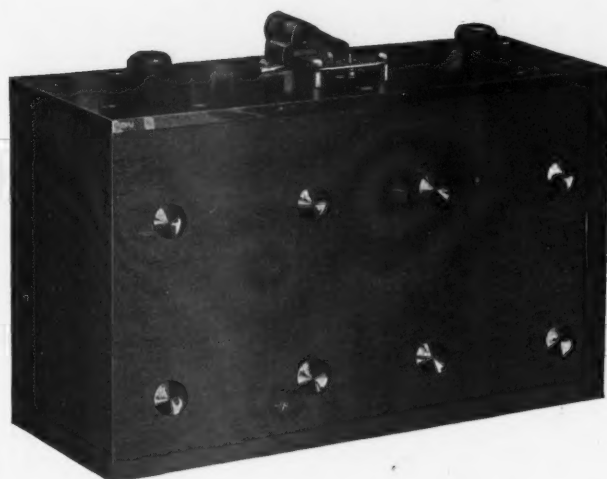
# ANNOUNCEMENT

## KINGSTON

### Single Vibrator Coil for Ford 1914-15 Cars

Only One  
Vibrator  
Adjustment

A Perfect,  
Even Spark  
at Every  
Plug



Why Use  
Four  
Vibrators  
When One  
Will Work  
Far Better?

**I**T fits in the metal coil box used on 1914 and 1915 Ford cars. Just take out the four vibrating units, slip in the KINGSTON SINGLE VIBRATOR COIL and notice the difference.

It will solve all Ford ignition troubles. The spiral spring on the vibrator will not allow the contact points to stick.

Thirty days' free trial. Write for particulars.

**AGENTS**—There will be a large demand for this coil. Write for our proposition by return mail.

## Kokomo Electric Company, Kokomo, Ind.

*Space 64 Chicago Show*

New York Branch  
1733 Broadway

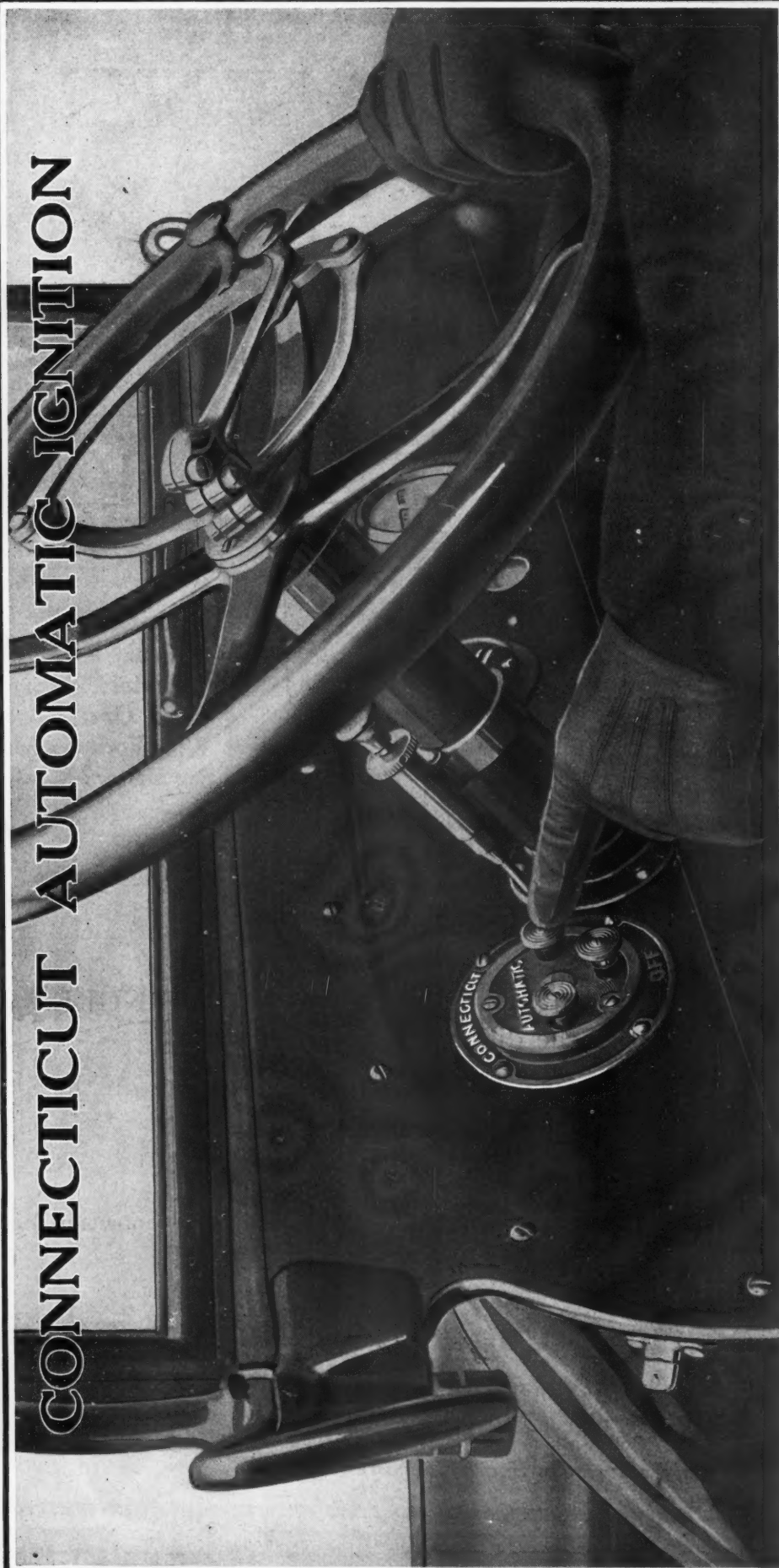
Los Angeles Branch  
334 W. Pico St.

Detroit Branch  
650 Woodward Ave.

Chicago Branch  
1430 Michigan Ave.

*Largest Manufacturers of Spark Coils in the World*

# CONNECTICUT AUTOMATIC IGNITION



## The Sign of Unqualified Efficiency

*The storage battery of a starting and lighting system is charged by a generator, which is equally as dependable and as inexhaustible a source of current supply as the magneto's. This Generator always provides an abundance of current for ignition, over and above that required for starting and lighting.*

With Connecticut Automatic Ignition on your car, you can be sure of two things—

First:—Your ignition system is far superior to the magneto and better than any of the modern battery ignition systems.

Second:—Your ignition is not only better than



any of the others but it tempers its output to meet the needs of your car's motor for every phase of driving.

Connecticut Automatic Ignition includes every advantage of other forms of ignition and is free from the limitations to which other systems are subject.

#### Little Difference in Cost

So when your car is equipped with this system, and whenever you see the Connecticut Automatic Switch on the dash you can be sure the maker of your car has given you unqualified ignition efficiency.

Why compromise with an inferior equipment when the difference in cost is so little? The ideal adaptation of Connecticut Automatic Ignition is in conjunction with a generator supplying current to a storage battery for lighting and starting.

The Connecticut Automatic Igniter System is fully as great an improvement over the present day magneto as the magneto was over the old-time vibrating coil.

#### More Effective Spark at High Speed Than Magneto

The Automatic Igniter produces its hottest spark on the slowest speeds whereas the magneto spark is weakest on slow speeds and hottest at high, but even so the Igniter will give a more effective spark on the high speed than the magneto and on medium and low speeds there is no comparison.

#### Material Saving When Electric Starters Are Used

On cars equipped with electric starters and in fact for any kind of starting, it will be readily appreciated what an advantage the Automatic Igniter with its hot spark will be over any other form of ignition.

When electric starters are used the saving on the Battery will be very material.

#### Simplest System of Ignition Thus Far Devised

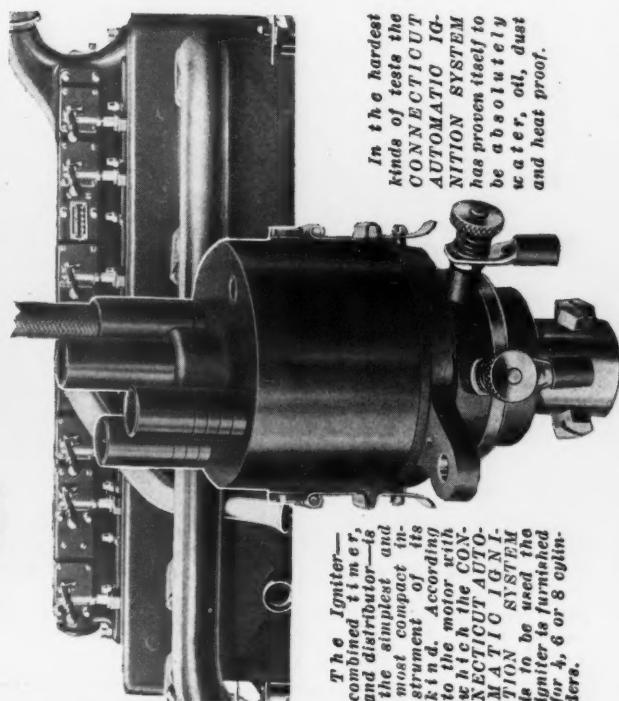
A hot spark is most necessary when throttled down in traffic or otherwise, or when hill climbing with a heavy charge of gas. Under these conditions the difference over the magneto turning over slowly and producing its weakest spark is most noticeable. It is the simplest system of Ignition thus far devised and can be quickly understood by the average garage man.

No other battery ignition system can approach Connecticut Automatic Ignition in efficiency, for the closed circuit types have the fatal weakness of being unable to protect their ignition source against draining. Mechanical and electrical lag are ever present in relay and instant contact type systems—either or both are fatal to synchronism. This kind of ignition cannot graduate the quality of its sparks to meet conditions of carburetion, starting, slow running, hill climbing, etc.

**CONNECTICUT TELEPHONE COMPANY, Inc.**  
**MERIDEN, CONN.**



This is the transformer coil which carries the primary and secondary windings. While the points in the breaker-box are closed the primary coil is being saturated. When the primary circuit is broken induction sets up a high tension current in the secondary winding.



The Igniter—combined timer, and distributor—is the simplest and most compact instrument of its kind. According to the motor with which the CONNECTICUT AUTOMATIC IGNITION SYSTEM is to be used the igniter is furnished for 4, 6 or 8 cylinders.

In the hardest kinds of tests the CONNECTICUT AUTOMATIC IGNITION SYSTEM has proven itself to be absolutely water, oil, dust and heat proof.

*The relative superiority of one ignition system over another amounts to very little unless it reveals itself in the performance of the motor, its starting, idling, hill climbing, fast running and in a hundred and one other ways.*

*The relative superiority of CONNECTICUT AUTOMATIC IGNITION is so conspicuous that the most inexperienced driver feels it at once in the snap and vim it engenders.*

When Writing to Advertisers, Please Mention Motor Age.

# WARNER

**"THE RECOGNIZED STANDARD"**



**Leaders For Fourteen Years**

DIFFERENTIALS  
TRANSMISSIONS  
STEERING GEARS  
CLUTCHES

## **WARNER GEAR CO.**

**Detroit Office, Ford Building**

**MUNCIE, INDIANA**

*When Writing to Advertisers, Please Mention Motor Age*



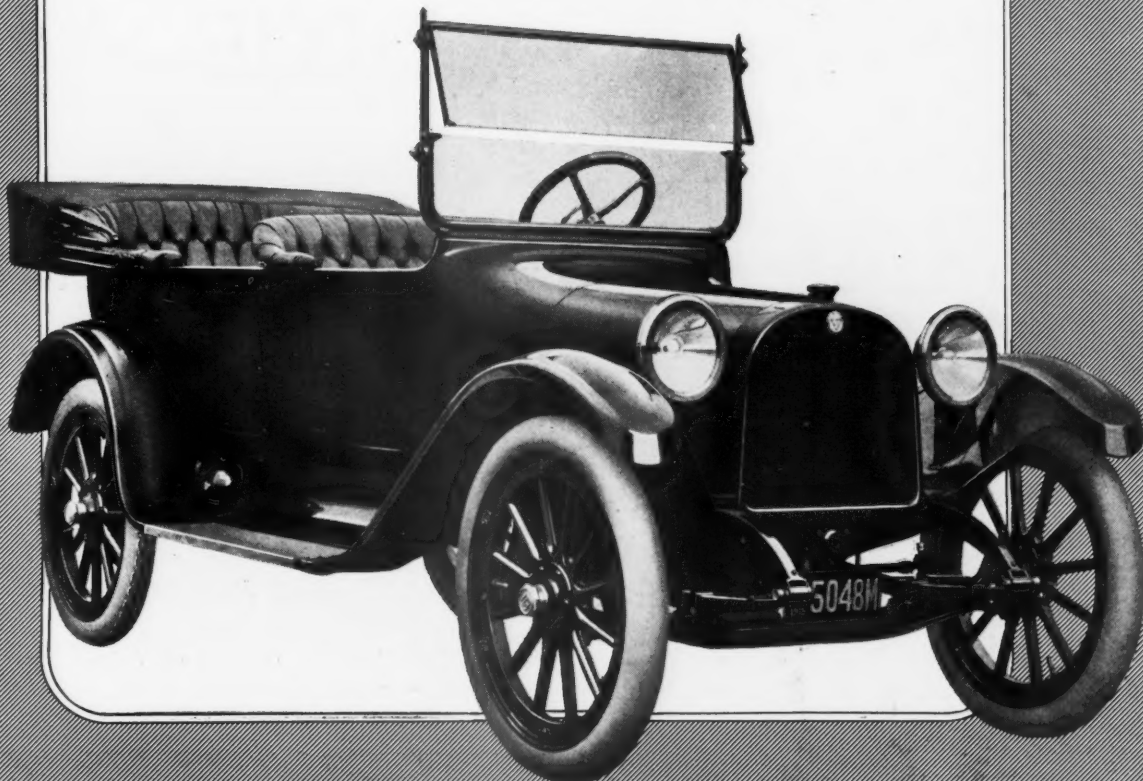
# DODGE BROTHERS MOTOR CAR

It will interest you to scan the specifications item by item, and see if you can conceive how the material, the design, or the manufacturing practice could be improved.

You will find such vital parts as the springs and the gears made from Chrome-Vanadium steel; drop forgings and drawn work used exclusively instead of castings; the rear axle, of the finest full floating type; the upholstery, real grain leather with curled hair filling; Eisemann waterproof magneto; Timken bearings thruout; S. R. O. ball bearings in clutch and transmission; a 30-35 horse power four-cylinder motor; electric lighting and starting, etc.

The wheelbase is 110 inches  
The price of the car complete is \$785  
f. o. b. Detroit

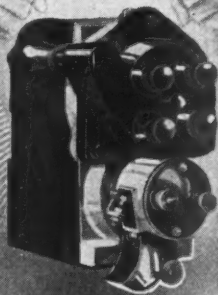
**DODGE BROTHERS, DETROIT**



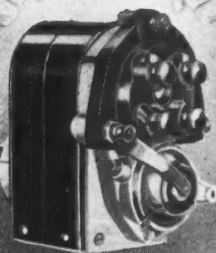


# SPLITDORF

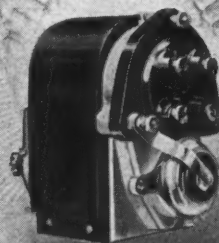
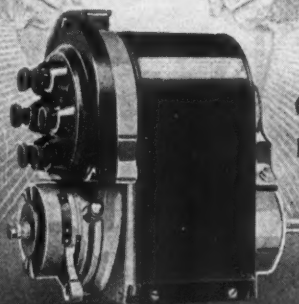
DIXIE  
TYPE



MODEL EU4  
HIGH TENSION  
MAGNETO



CUNNINGHAM  
HIGH TENSION  
MAGNETO



MODEL EU4-2  
HIGH TENSION  
MAGNETO

Automobile engineers prefer  
magneto equipment on the  
cars they design

## OVERLAND

ignition for 1916 will be exclusively

## DIXIE

The Willys-Overland Co. has placed the  
largest magneto order ever given

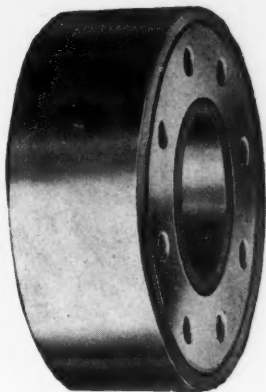
For their entire 1916 output

**SPLITDORF ELECTRICAL CO.**  
NEWARK, NEW JERSEY

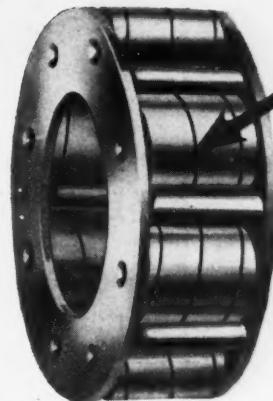
*(All SPLITDORF features are fully covered by  
patent or patents pending)*

# Where Hyatt Roller Bearings are different—and better

A Completely Assembled Hyatt Quiet Bearing with the Inner and Outer Races.



Anti-Friction Bearings are very similar in outward appearance. The difference lies in the shape or design of the inner and outer races in conjunction with that of the rolling element. Some bearings employ balls as the rolling element and others solid rollers. The Hyatt Bearing employs flexible steel rollers—an exclusive Hyatt feature.



An Inside View of a Hyatt Roller Bearing with the Outer Race Removed, showing the Spiral Rollers.

## Why this Spiral Construction means Bearing Perfection for Motor Cars

When your car hits a bad spot in the road, you have noticed how the strain tends to twist and distort the car.

Most of this twisting and distortion is transmitted to the bearings of the axles and transmission.

The Hyatt Bearing, on account of its construction, is the one bearing which does not transmit any excessive load to the surrounding mechanism. The Flexible Hyatt Roller gives just enough to relieve the gears and shaft of this strain, and in this manner saves wear and tear.

You know that sound is transmitted by vibrations, if you stop vibrations you deaden sound—the flexible rollers of the Hyatt Bearing absorb vibrations instead of transmitting them and thus reduce objectionable noise.

A “full line contact” in the bearing is also made possible by the flexible roller. This insures an even distribution of the load over the entire length of the roller, minimizing wear and eliminating all necessity of adjustments.

Another splendid feature of the Hyatt Roller is that it is self-cleaning. Grit and dirt will work into all automobile bearings, and ordinarily will grind between the bearing surfaces, causing rapid wear, with the attendant rattle and noise. In Hyatt Roller bearings grit and dirt is forced into the hollow center of the rollers through the spirals, keeping the surfaces exceptionally clean.

The many advantages, gained by the flexible spiral roller, are responsible for the fact that practically all prominent American automobile manufacturers are using Hyatt Roller Bearings.

Two books, one about motor car bearings in general for prospective purchasers, the other for automobile owners, will be sent on request.

## HYATT ROLLER BEARING CO.

### DETROIT, MICHIGAN

CHICAGO ILL. NEWARK N.J.

When Writing to Advertisers, Please Mention Motor Age.





*The Word for Transmission Quality*

### **Look for "Covert" in the New Specifications**

Look for "Covert" in the specifications of the 1915 cars and trucks now announced. It is a name worth finding. It indicates not alone transmission reliability, but also shows the engineering discrimination and honesty of purpose possessed by the car manufacturers who use it.

It is now conceded that specialists building thousands of transmissions yearly can produce a better transmission than the individual car builder can manufacture in limited quantities for his own vehicles. On this principle of specializing rests the foundation of American manufacturing supremacy. And the Covert is the highest exponent of this principle in so far as automobile transmissions are concerned.

No longer do automobile manufacturers withhold the trade names of the various units they employ, fearing that buyers will think their output an "assembled" product. Now it is realized that the buyer's confidence in a part of well known merit adds materially to his confidence in the vehicle which uses it. When this is considered it is found that the actual value of the Covert reputation is as important to the sales department as Covert efficiency is to the engineering department.

Covert Transmissions are regularly used in a large number of the most successful cars and trucks now on the market. They have contributed more than their share to the success of these vehicles. They perform their work so unobtrusively that the operator seldom has occasion to give thought to this part of his car. They advertise themselves by their ability to make the driver forget them.

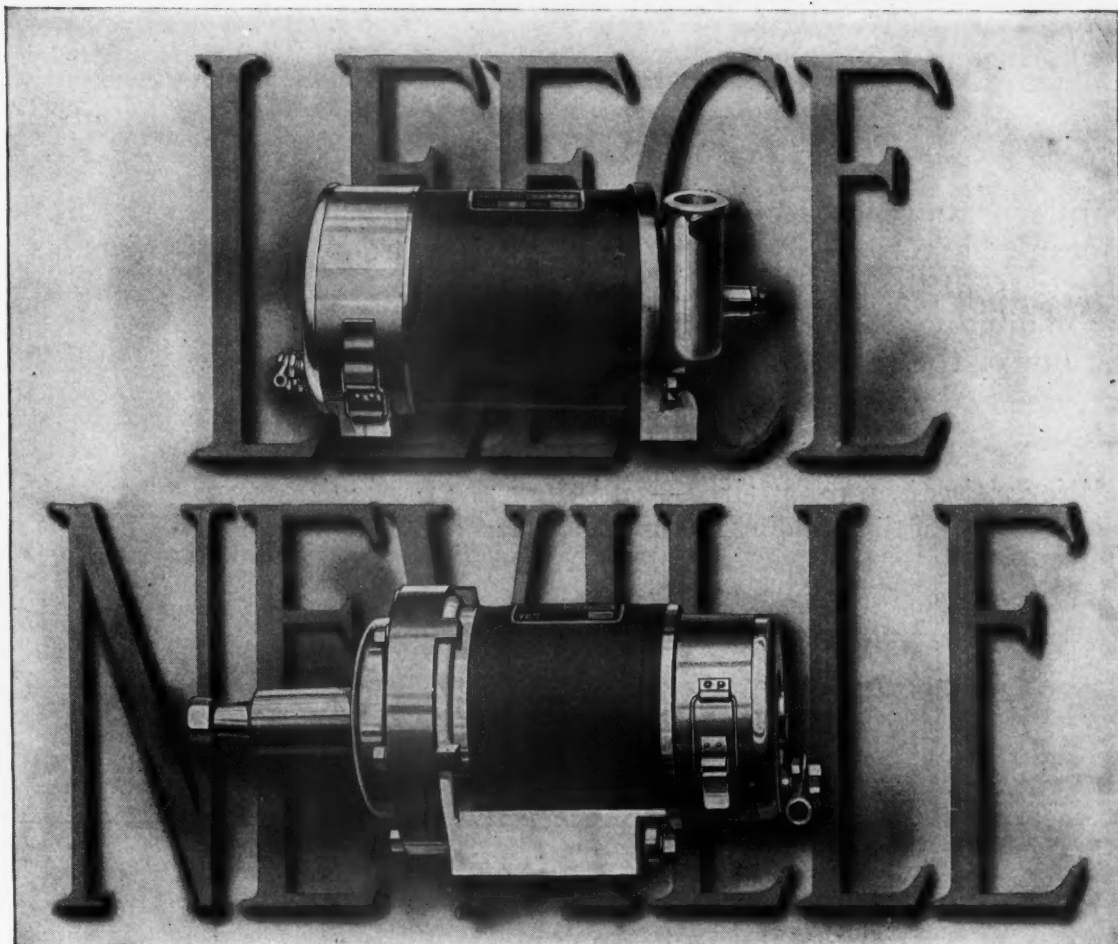
Manufacturers, owners or prospective buyers are invited to send for catalog giving in detail the advantages of Covert construction. To manufacturers and engineers we offer the co-operation of specialized transmission experts in designing the transmission layouts for any motor vehicle.

## **COVERT MOTOR VEHICLE COMPANY**

**Factory, Lockport, N. Y.**

**Sales Office, Detroit, Mich.**

*At the Show you should see the*



## Electric Starting *and* Lighting System

See it in Space No. 18, Coliseum Basement  
See it on Haynes Cars  
See it on Thomas Cars

*Write us for full information*

**THE LEECE-NEVILLE COMPANY**  
1051 Power Avenue, Cleveland, Ohio

(43)





## Miller Doesn't Pit One Dealer Against Another

THE Miller Plan gives a single dealer the exclusive privilege to sell Miller Tires. He doesn't have to divide the profits with other dealers. He owns his own tire trade. He gets all the profit—not a small slice of it.

If you are dividing the profit with *one* or more dealers by handling other makes of tires—get out of the rut—join the Miller Prosperity Procession.

## Miller GEARED TO THE ROAD Tires

are sold differently than most tires—and they are made differently, too.

The Miller Method of tire building doesn't cook the life out of the rubber and fabric in vulcanizing. It preserves all the rubber's native toughness and the fabric's strength *for wear on your car*. The Miller Method is the net result of 23 years of rubber experience. That is why Miller Tires give your customers greater mileage, service and satisfaction. The Miller Plan of selling gives *you* real profit.

Write at once and get details of the Miller Selling Plan before some other dealer gets the Miller agency in your town.

THE MILLER RUBBER CO., Akron, Ohio

"I can't get MOTOR AGE on the news-stands. For the enclosed 10c. please send me a copy of the \_\_\_\_\_ number."

**We** can't help it if the news-dealer didn't order enough to supply everybody.

**He** isn't to blame if he buys only enough to fill his orders.

**You** can't expect the demand to be exactly the same at all news-stands all the time.

If you don't order ahead at the news-stands you're likely to be disappointed often. A subscription for the year at \$3.00 is disappointment insurance.

Your news-dealer will take your subscription or we will if you'll mail it to

## MOTOR AGE

1004 Karpen Building, CHICAGO

The Leader  
for 6 Years



The Proven  
and Accepted  
Standard



The NEW YORK was the first SUCCESSFUL MASTER VIBRATOR to be placed on the market—that was over six years ago and it still holds FIRST PLACE, because thousands of Ford owners have learned this is the ONE vibrator that does not stick, require frequent adjustment, or give the trouble common to others. It insures a hot powerful spark, easy starting, extreme power, and smooth, steady running.

Eliminates carbon, over-heating, and all coil adjustments or replacements.

Contact points for our vibrators are in sealed red envelopes bearing our name as manufacturers. All others are worthless imitations.

NEW YORK COIL COMPANY 338 340 PEARL ST. NEW YORK  
WESTERN BRANCH 1461 MICHIGAN AVE. CHICAGO, ILL.

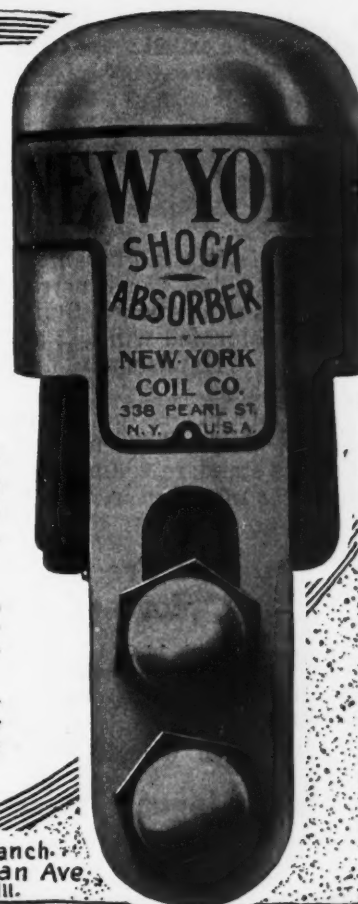
# THE New York Shock Absorber for Ford Cars

Price \$7.00 Per Set of Four

Attached in fifteen minutes without removing the wheels, radius rods, or spring perches. No bearings to wear out or replace, no tin covers to rattle loose and become lost, no attention after once installed—which any owner accomplishes in a few minutes by the simple removing of spring shackles and placing our Absorbers in their places.

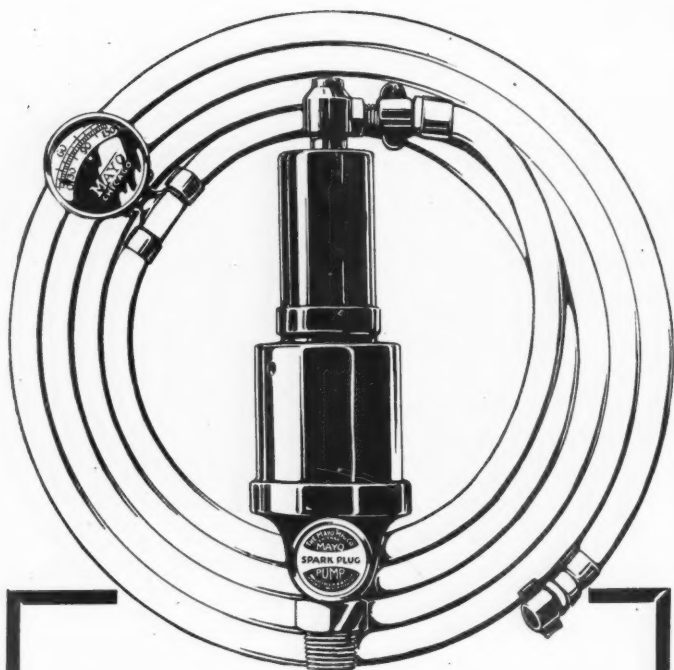
They operate in two directions and are perfectly free from all side sway. They give a luxuriance to the Ford seldom obtainable in the highest priced cars. One very advantageous feature is the fact that the regular fittings supplied on the Ford car are left intact, which is not the case with other Absorbers.

Aside from the labor of installing the ordinary shock Absorber the substitution of other parts not furnished by the Ford Company most always results in throwing the running gear out of line resulting in difficult steering and great wear on the tires, due to improper tracking of wheels—a condition impossible with the NEW YORK. "They are correct in every way or they would not bear our name plate."



New York Coil Company  
338-340 Pearl St N.Y.

Western Branch  
1461 Michigan Ave.  
Chicago, Ill.



## \$10—Unnecessary to Pay More Unwise to Pay Less

The MAYO at \$10 will do anything any pump will do, regardless of price. Moreover, the MAYO offers certain exclusive advantages obtainable in no other pump on the market.

The MAYO Pump is capable of producing 150 pounds pressure, twice as much as you will ever be called upon to use. It will easily inflate the largest tire. It pumps a tire faster than any other motor-driven pump.

## MAYO SPARK PLUG PUMP

The MAYO is guaranteed to pump pure, fresh air only. Constructed of highest-grade materials throughout. Built with metal rings like a motor and will last as long. Instantly attached. Handsomely finished in durable black enamel.

The MAYO is the pioneer of power tire pumps. It has been making good for years. Used as standard equipment by several prominent car manufacturers. Demand MAYO—accept no substitute.

### Try One Free on Your Car for 30 Days

Complete, with 12 ft. hose and gauge, price, \$10. MAYO Ford Pump complete with hose and gauge, \$8. MAYO Valve Cap Pump for permanent attachment to motor, \$15.

**DEALERS:** Write for liberal proposition.

**Mayo Manufacturing Company**  
55 East 18th Street CHICAGO

# PERKINS'

## Adjustable Condensing Driers

PATENTED

Just how adjustable, the following daily record of one week's drying of Green Gun Stocks shows:

Date.	Kiln Temperature.	Water Temperature.	Humidity.
October 2.....	106.	70.	43
October 3.....	108.	70.	41
October 4.....	108.	72.	40
October 5.....	106.	72.	39
October 6.....	106.	72.	42
October 7.....	106.	70.	40
October 8.....	110.	70.	39

This record shown is the fourth week in drying. Walnut stands a higher temperature and can be dried with less humidity than oak.

The plant at Podolsk, Russia, recently taken over by the Russian Government, for the manufacture of firearms, has drying and storage sheds of my designing and is using eight of my Adjustable Condensing Kilns. In 1910 I designed eleven for The Winchester Repeating Arms Co., allowing them to double their drying capacity.

A gun stock is required to have the full tensile strength of the wood and to resist wear and weather. It has pleased me that my work has received full commendation from manufacturers, whose requirements are exact in drying effects and economy of operation.

My driers are in operation all over the world, drying all varieties of wood, and each coat of finish also in the finish of wall paper and may be used wherever varnish is used in manufactures.

"A Talk on Drying" will be mailed you on application.

**ELMER E. PERKINS**  
MONADNOCK BLOCK CHICAGO, ILL.



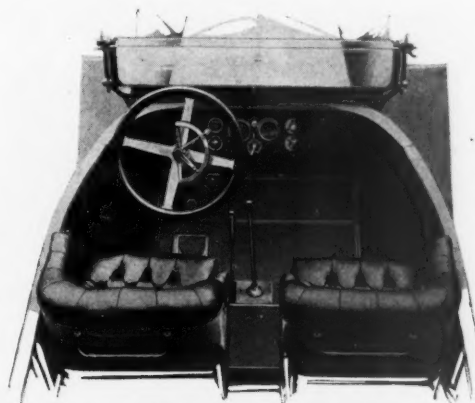


**P**LACE your confidence in the *National*—the car itself and the business methods of its builders—in the same spirit that you leave your money with a bank or trust company.

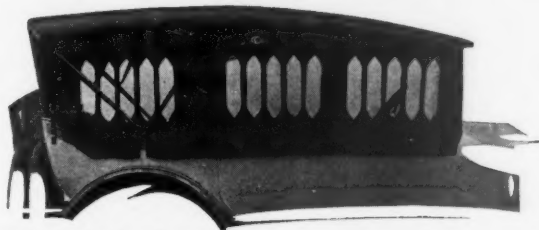
A car can't be any better than the factory back of it. A dealer can't enjoy permanent success unless the factory does.

The *National* car's record is one of success—one of international leadership. The fifteen year old company back of it is successful. *National* dealers are successful—*National* owners never have to apologize for or explain their choice.

Seven distinct body styles.



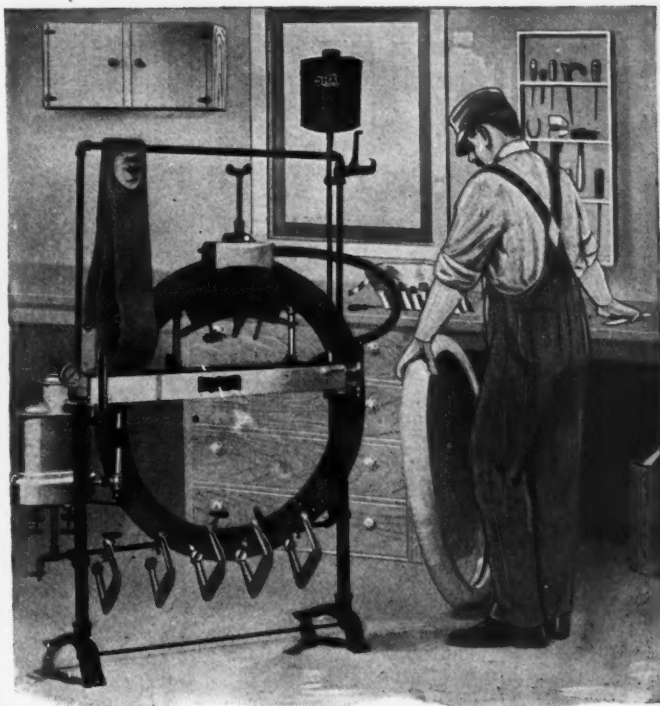
Divided front seats, roominess, all dash equipments mounted on solid plate and set flush with dash within handy reach, and access to both front and side doors



*National* "one-man tops" are tailored to conform to the graceful design of the car. Carefully made Jiffy curtains are carried inside the top.

*National* Sixes develop any part of 55 h. p. at a fuel efficiency up to 17 miles per gallon. *National* car sales increased 45 per cent in 1914.

**National Motor Vehicle Co., Indianapolis**



## Make Money Like This Man

He is a garage man and is repairing tires for his storage customers. These cars need to have the tires vulcanized very often and he makes more money from this source than he does from the storage bill or sale of supplies. You can do the very same thing with a

## SHALER Vulcanizing Plant

The auto owner, when he comes to you for supplies, gasoline, oil, etc., and knows that you can repair his tires, will gladly give you the job. Give your customers this complete service they like and be ready to repair their tires.

You can easily add £20 to \$30 more to your daily revenue without adding to your pay roll.

Anybody who can clean or adjust a car can operate a Shaler, because of the simplicity of Automatic Heat Control and

### The Shaler Wrapped Tread Method

The Shaler System has been used successfully by tire makers for many years.

### Automatic Temperature Control

This is an exclusive feature that keeps the temperature of vulcanizer exactly at the right point from morning till night without any watching or regulating.

### New Complete Catalog Free

Write us today for full particulars about the money-making possibilities with Shaler Vulcanizing Plant—the low price and liberal discount. We will also send you our new catalog of the complete line of Shaler Vulcanizers—and our book for dealers, "Common Sense About Tire Repairs."

**C. A. Shaler Co., 204 Fourth Street, Waupun, Wis.**

*The largest Manufacturers of Vulcanizers in the World*

Canadian Distributors—John Millen & Son, Limited, Toronto, Winnipeg, Montreal, Vancouver, Victoria

# BLOWOUTS

have no worries for motorists whose tool box carries a "No Stretch" Boot



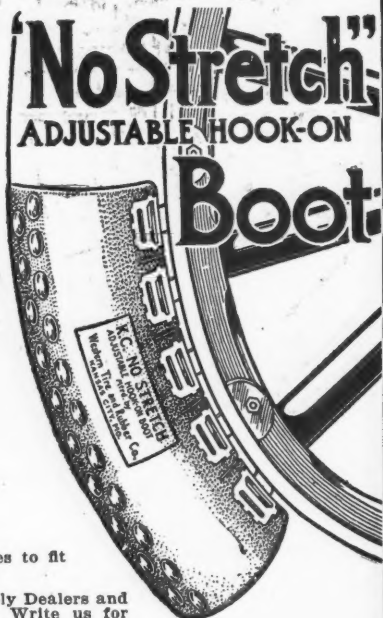
the only Boot that combines the wearing strength of steel-studded leather and the water-resisting qualities of a rubber boot.

Fits your tire like a duck's foot fits the mud. ADJUSTABLE three ways to take up every variation in new-tire and worn-tire sizes—Can't stretch, bump or come loose. Fits snugly—keeps out water and other destructive elements. Invariably it outwears the tire.

Made in all sizes and styles to fit every make of tire

Sold by Leading Auto Supply Dealers and Garages Everywhere. Or, Write us for Complete Catalogue of K-C Tire Accessories.

**WESTERN TIRE & RUBBER COMPANY**  
"America's Largest Tire Accessory Makers"  
KANSAS CITY, MO.



**"There's a mighty big difference in lubricators!"**

Don't blame your car for what it can't help. Many a car is inefficient only because its lubrication is bad. Try Badger Gear Compound just once and notice the difference.



## BADGER Gear Compound

Is "Always on the Teeth"

It never runs thin and stays where you put it. Will not pack the sides of the gear case. Nothing like it for minimizing wear and quieting rear axles and transmissions. **Every ounce lubricates.** Learn

more about this power-saving lubricant—also about the popular F. V. Motor Oil and Badger Lubricants. Ask your dealer or write us.

Dealers, Write Us

**WADHAMS OIL COMPANY**  
Milwaukee, Wis.

Coast Distributor: Wadhams Oil Company of Washington, Seattle, Wash., and Vancouver, B. C.



## The AERMORE Exhaust Horn

**Polite Yet Effective**

Can be heard a block or a mile. It pleases the ear whether blown low or loud. Just the horn you want. Here are the reasons:

**Musical Sound**—Built on the principle of a pipe organ. Four notes, blown at once, produce perfect harmony.

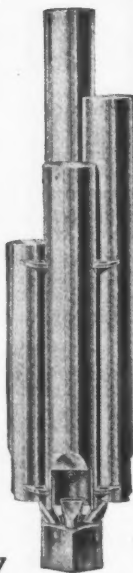
**No Upkeep**—First cost is only cost. Made of brass tubes, nickel-plated. Nothing to wear out.

**Reliable**—Cannot clog. Cannot be tampered with when car is standing.

**Clears the Way**—Amplly warns but does not frighten.

**Easy to Put On**—Nothing shows but the foot pedal.

Get it from almost any dealer. Price \$5.50 to \$7.50 complete. Every horn guaranteed. Sold direct where local dealer does not carry it. Descriptive folder sent on request.



**The Fulton Company**

727-729 National Ave., Milwaukee, Wis.

## An Illuminated Curbside Pump

It attracts trade. A handsome advertisement for your place of business. The pump is rapid in operation, strong and reliable. Measures with absolute accuracy.

**QUALITY**  
**TOKHEIM**  
OIL AND GASOLINE  
**OUTFITS**  
For Public And Private Garages

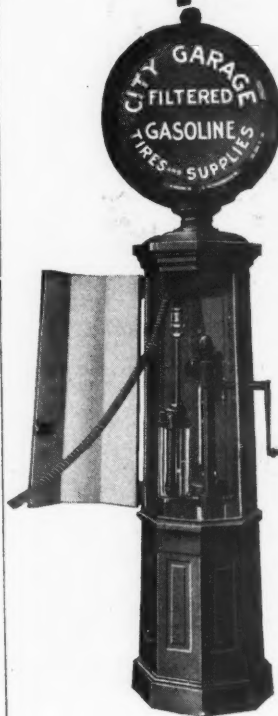
Tokheim Outfits are supplied in all sizes, at all prices, for all requirements—for both public and private garage use. Used by the United States Government and O. K'd by underwriters.

**Dealers:** We have a proposition of interest to you. We will sell you public garage outfit, at the same time give you agency for the complete Tokheim line. Choice territory still open.

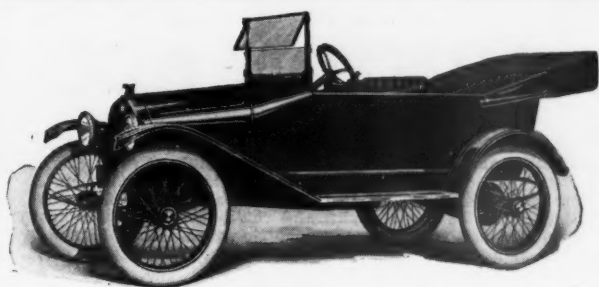
**Auto Owners:** Write us for prices and catalogs.

**Tokheim Mfg. Co.,**

Main Office and Factory  
815-19 N. First St., West,  
Cedar Rapids, Iowa







# METZ '25

The Quality Car

## A GREAT BIG PROPOSITION FOR DEALERS

This new Metz Touring Model will help you to do a much bigger business, and a very profitable business. The demand for just such a car as this will show a greater increase this year than ever before.

Listed at \$600, its equipment includes Gray & Davis electric starter and electric lights, rain-vision windshield, one-man top, luxurious upholstery, 32-in. wheels, 3½-in. Goodrich clincher tires, Bosch magneto, Hyatt bearings, gasoline gauge, speedometer, signal horn, tools, etc. It is a handsome appearing car, a car any owner will be proud of, and so simple in operation that a woman can safely drive it. It will pay you to handle the METZ.

Write for particulars and New Catalog "K"

METZ COMPANY, Waltham, Mass.



Master  
Vibrators

← This is the  
Only Trade Mark  
Under Which K-W Master  
Vibrators are Sold

You are particularly cautioned against imitations apparently resembling the K-W Master Vibrator in many details and being offered by some dealers under private trade names. Look for the K-W Trade Mark and serial guarantee number.

A handsomely finished box means nothing. It's the electrical detail that makes a Master Vibrator reliable and efficient and years of service alone will prove this. Over 125,000 K-W Master Vibrators giving efficient service is proof that the K-W is electrically right. That is why every K-W Master Vibrator is "Guaranteed for life."

The K-W Master Vibrator is the Standard of Excellence all over the world. It's a tried and proven accessory for a Ford car, with 100% efficiency.

Your nearest dealer will gladly show you the merits of the K-W Master Vibrator. Literature on request.

Price \$15 with Kick Switch—with Yale Lock Switch \$16.



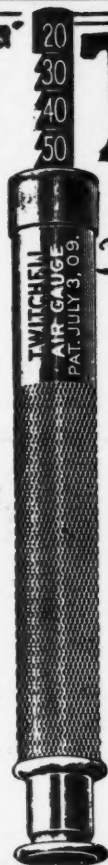
HEADLIGHTING  
OUTFITS

THE K-W IGNITION CO.  
28315 CLEVELAND AVE.  
CLEVELAND, OHIO, U.S.A.

SPARK COILS  
SPARK PLUGS

# Twitchell Air Gauge

The New Positive Lock Stop



feature renders absolutely impossible the registration of any but the exact pressure in your tires.

## Don't Guess

Tires inflated to forty pounds look and feel exactly like tires containing eighty. The only way to tell the exact air pressure in your tires is by means of a TWITCHELL gauge.

Price One Dollar

For Sale by Jobbers, Dealers and Garages, or

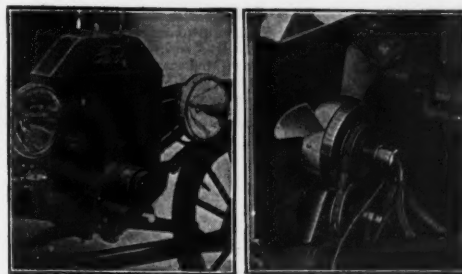
THE TWITCHELL GAUGE CO.  
1201 MICHIGAN AVE., CHICAGO

Two-Unit

# Kemco

Electric

## STARTING-LIGHTING SYSTEM



SEE IT AT THE SHOW  
CHICAGO

Coliseum Annex, Space 147-148  
Second Floor

Dealers—Make it a point to visit our exhibit and let us explain the merits of this wonderful outfit. Let us show you why it is the most reliable, easiest selling and most profitable outfit for you to handle.

The Kemco Elec. Mfg. Co. 2233 Ashland Road  
Cleveland, Ohio



## No Garage Can Do Without

the means to determine promptly the exact condition of the electrical equipment of any automobile.

# Weston

### ELECTRICAL TESTING INSTRUMENTS

are absolutely dependable in locating trouble in starting and lighting systems, or proving its absence. Built to conform in every way with the exacting Weston standard, they are accurate, serviceable, reliable, yet inexpensive. Write for special booklet describing Model 280.

WESTON ELECTRICAL INSTRUMENT CO., NEWARK, N. J.

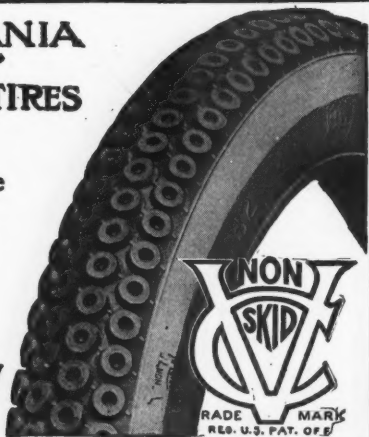
## PENNSYLVANIA Oilproof VACUUM CUP TIRES

Making their  
mark everywhere

Guaranteed for  
4500 miles

**Pennsylvania  
Rubber Company**

Jeannette, Pa.



## WINTON SIX

What a welcome relief to be able *now* to get in the New-Size Winton Six, at the previously impossible price of \$2285, all the super-quality, beauty, and individuality that heretofore could be found only in the biggest and most costly cars. You'll love this car at sight, and you'll love it all the more when you see your own personal New-Size Winton Six finished in a color scheme selected by yourself. Let us send you a catalog.

THE WINTON MOTOR CAR COMPANY

424 Berea Road, Cleveland, Ohio

*World's First Maker of Sixes Exclusively*

# Lexington

CRITERION OF ITS CLASS

Thoroughbred Six—\$1875      Famous Four—\$1375  
Six Supreme—\$2575

All equipped with the Moore Multiple Exhaust

*Write for Details and Co-operative  
Dealer Proposition*

The Lexington-Howard Co.      Eighteenth Street West  
Connersville, Ind., U. S. A.

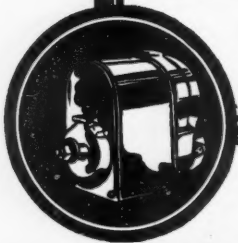
# EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

**The Eisemann Magneto Company**

Sales and General Offices,  
32-33d St., Brooklyn, N. Y.

New York, N. Y.    Indianapolis, Ind.    Detroit, Mich.  
245 W 55th St.    514 N. Capitol Ave.    802 Woodward Ave.



## Electric Auto-Lite Starting—Lighting—Ignition

Electric Auto-Lite equipment for automobiles is as famous for the service that backs it as for the reliability and economy of its operation.

**ELECTRIC AUTO-LITE COMPANY**

Home Office and Factory: Toledo, Ohio

New York    Detroit    Kansas City    San Francisco

# Schrader

For sale by Tire Mfrs., Jobbers and Dealers of  
**A. Schrader's Son, Inc.**  
783-791 Atlantic Ave., Brooklyn, New York

Universal  
Valves



PAT. MAR. 11, 1891, JULY 6, 1903, OTHER PAT. PENDING  
**SCHRADER UNIVERSAL**  
TRADE MARK REG. IN U.S. PAT. OFFICE  
**TIRE PRESSURE GAUGE**

MADE BY A. SCHRADER'S SON, INC., NEW YORK



# Raybestos

REG. U.S. PAT. OFF.

**THE PRODUCT OF BRAKE SPECIALIST**

USED FOR

**BRAKE LINING - CLUTCH FACING**

Manufactured by

**THE ROYAL EQUIPMENT COMPANY**

Bridgeport Conn.

# HOUK Detachable WIRE WHEELS

"The wheel that makes any car modern"

GEORGE W. HOUK COMPANY

1702 Elmwood Avenue, Buffalo, N. Y.



See the new enclosed Ford cars

The Coupelet, a luxurious two-passenger car, and the five-passenger Sedan, a roomy, stylish family car. Prices of the Ford line: Coupelet \$750, Sedan \$975, Runabout \$440, Touring Car \$490, Town Car \$690 f. o. b. Detroit fully equipped.

Ask nearest Ford branch or dealer about Ford profit-sharing with retail buyers.

*Ford Motor Company*

Detroit, Mich.

YOU CAN

Blow an electric horn  
Burn your lights  
Run your engine  
with an

Complete  
System  
\$50.00



Complete  
System  
\$50.00

ELECTRIC LIGHTING SYSTEM

Dealers, write

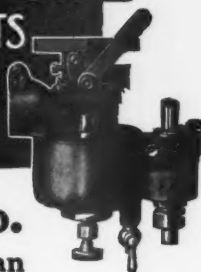
XCEL-O-LYTE COMPANY (Formerly  
NEWTON, IOWA)

# HOLLEY

CARBURETOR

NO MOVING PARTS  
ONLY ONE ADJUSTMENT

WRITE FOR  
PARTICULARS



Holley Brothers Co.  
Detroit Michigan

GUARANTEED  
ONE YEAR



The reasons for HERZ PLUG'S superiority to ordinary makes are definite and obvious.

The insulation is DOUBLE STONE. The electrodes are PLATINUM-ALLOY. There are FOUR SPARKING POINTS. HERZ PLUG is SELF-CLEANING. It is GUARANTEED A FULL YEAR.

Price, \$1.50

Order from your dealer or

HERZ & CO., 245 W. 55th St. (nr. B'way), New York

# Supreme Auto Oil

Light  
High Viscosity

Medium

Heavy  
Low Cold Test

## The Ideal Cold Weather Oil

Does Not Congeal—Flows Freely at Zero  
Burns cleanly—leaving a minimum carbon deposit.

THERE IS MORE POWER IN  
THAT GOOD GULF GASOLINE

We have an attractive and liberal proposition for Dealers and Garages. Write our nearest office.

### GULF REFINING COMPANY

General Sales Offices, 1375 Frick Annex, Pittsburgh, Pa., U.S.A.

#### DISTRICT SALES OFFICES:

New York Philadelphia  
Boston Atlanta  
Tampa New Orleans  
Houston



Write for our booklet  
"Progressive Lubrication"  
—Sent Free



# NEW VULCAN "35"

"A Quality Car at a Quantity Price"

PRICES  
TOURING CARS 5 PASSENGER **\$975** ROADSTERS 2 PASSENGER

Completely and fully equipped, with Westinghouse Starting, Lighting and Ignition System

F. O. B.  
PAINESVILLE  
OHIO

Manufactured by VULCAN CAR CO., Painesville, O.

Use the Most Efficient  
Lubricant Procurable

TRADE MARKS  
**NON-FLUID OIL**  
REGISTERED PATENT OFFICE



Used instead of LIQUID oils, or greases, it will make your cars more efficient, minimize your repairs, and decrease your lubrication bills. It was perfected for this specific purpose. No matter what lubricant you now use NON-FLUID OIL will lubricate BETTER and MORE ECONOMICALLY. Automobile manufacturers recommend it. Try it out on your own car. "K. No. 00 Special" grade for sliding gear transmission "K. No. 000" for differential, compression cups and all bearings. Sold by leading dealers everywhere. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

New York & New Jersey Lubricant Co.  
165 Broadway, New York 1430 Michigan Ave., Chicago, Ill.



## RAJAH GIANT PLUG

### TELEGRAM

Won fifty-mile race, Ascot Park, defeating Barney Oldfield. Used Rajah Plugs—will continue to use them—also will recommend them to other drivers.

BOB BURMAN.

Rajah Auto-Supply Co., Bloomfield, N. J.

John Millen & Son, Limited—  
Montreal, Toronto, Vancouver, Winnipeg.



## Steel Protectors

Each section 2" wide 1/8" thick. They hook to rim. As flexible as ever. Anti-skid, can't blow out or rim cut.

HOW CAN THE RUBBER WEAR OFF IF IT IS COVERED WITH STEEL?

Try 2 or 3 sections over any old blowout  
Special prices to the first in new territory

Kimball Tire Case Co. 173 S. Hwy. Council Bluffs, Ia.



Tire covered complete

For best results use

## SEARCHLIGHT

Acetylene Service for Oxy-Acetylene Welding and Cutting.

The purest and dryest form of compressed acetylene, delivered to you in steel cylinders.

Open the valve and gas is ready.

Let us solve your acetylene problems.

WRITE FOR COMPLETE INFORMATION TO

**THE SEARCHLIGHT COMPANY**  
1016 Karpen Building, Chicago, Ill.

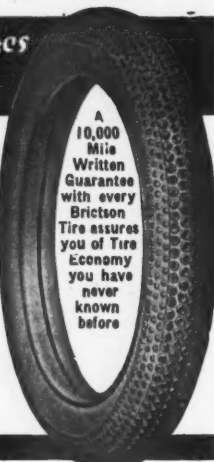
## Guaranteed for 10,000 Miles Bricton Pneumatic Tires

We now sell Bricton Pneumatic Tires on a specific guarantee of 10,000 miles service. Bricton Pneumatic Tires are Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim-cut-proof, Oil-proof and Gasoline-proof. A tire with wonderful resiliency and easy riding qualities.

**FREE TRIAL OFFER**—To remove any possible doubt concerning the merits of Bricton Tires and to back up our statements fully, we have a FREE TRIAL offer at our own risk. The only tire made that offers a FREE TRIAL—you can't go wrong. You risk nothing. We take all the risk. Be sure and ask for our FREE TRIAL plan when you write for particulars.

Have Your Present Tires Rebuilt the **BRICTON WAY**—if you are not in need of new tires and the fabric in your tires is still good, we can rebuild them the Bricton Way, give you thousands of miles additional service and make them Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim-cut-proof, Oil-proof and Gasoline-proof.

Write today for full particulars including details of FREE TRIAL PLAN.  
**THE BRICTON MFG. CO.**  
1215 Bricton Bldg., Brookings, S. Dak.



ELECTRIC  
**ISCO**  
SYSTEM

Electric Starting & Lighting System

It Spins the Motor

DISCO ELECTRIC  
STARTER COMPANY  
DETROIT MICH

**SALISBURY**

AXLES WHEELS  
PROPELLERS

Salisbury Wheel & Mfg. Co.  
JAMESTOWN, N.Y.





## Get This Catalog

It contains descriptions of all the famous Campbell Motor Car Accessories; Detachable Upholstery Percama, Johnson Model "D" carburetor, Straps, Boots, etc., etc.

*Territory open for reliable established dealers*

**The Perkins-Campbell Co.**

624 Broadway

CINCINNATI, O.

## Detroit EIGHT \$1295

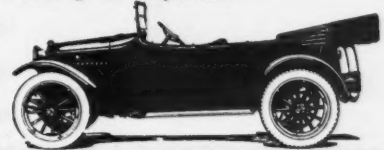
Full Floating Rear Axle, Platform Rear Spring Suspension, All Recording Instruments in One Unit, Red Electric Flash Oil Gauge, Carburetor Above Frame, 112 Inch Wheel Base, Left Hand Drive, Center One-Lever Control, Multiple Disc Clutch in Oil, Less than 2500 Pounds, 34 H. P. at 1800 R. P. M.


Briggs-Detroit Co., 455 Holbrook Ave., Detroit, Mich.  
*Write for Catalog and Proposition*

Fours . . \$850 to \$985

Sedan Eight . . \$1460

Sedan Four . . \$1150








### BOSTONSTARTER


#### For FORD CARS

¶ Fully Guaranteed. ¶ Does the work. ¶ Cost—a fraction of electric starting cost. ¶ No harm to car; does not interfere with cranking in usual manner. ¶ Releases in case of backfire. ¶ Retards spark automatically before starting. ¶ Time tried success—no experiment. ¶ Be sure you get the BOSTON STARTER. ¶ Ask the Ford dealer or your dealer or write.



Boston Starter, Boston Mass.



45 lbs.

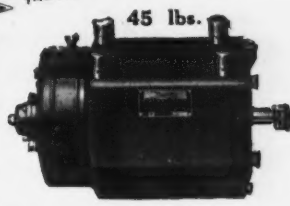
The Single Unit Electric Starting and Lighting System. Lighter, yet more powerful than most two-unit systems.

Famous on the Franklin

Write for Catalog and Full Particulars.


**DYNETO ELECTRIC CO., Syracuse, N.Y.**

Send Us Your Electrical Problems



# FEDDERS

# RADIATORS



**Fedders Manufacturing Co., Inc.**

Buffalo - - - N. Y.

## Dayton Airless Tires

**For War**—Recommended by American and Foreign Experts for motor car service.

**For Peace**—Used all over the United States on cars of all sizes. Comfort and absolute freedom from tire annoyances.

**For Fords**—We are obliged to double our production on these sizes every three months. Enough said.

**For All Cars**—A tire that is absolutely blow-out proof and puncture-proof.

**For You**—Write today for full details and name of nearest dealer.

**THE DAYTON RUBBER MFG. COMPANY**  
DAYTON, OHIO

## ZENITH

### CARBURETOR

For seven years the unchanging standard of quality motor vehicles

**Detroit U.S.A.**







## THE RUTEMBER MOTOR

Rutember Motors, fours and sixes, should not be judged by ordinary standards. They are not ordinary motors. Whether applied to pleasure cars or to commercial cars, these motors are invariably found to give service and satisfaction not attainable by standard built motors, regardless of price.

**THE RUTEMBER MOTOR CO., MARION, INDIANA**

## Model Motors are Reliable

TWO NEW SIZES  
2¾ x 4½ "Four" and 3 x 5 "Six"

AT THE CHICAGO AUTO SHOW,  
COLISEUM ANNEX, SPACES 119, 120, 121

PITTSBURGH MODEL ENGINE CO.  
Lexington St. and P. R. R. Pittsburgh, Pa.

## Sparton Warning Signals

for the low—the medium  
and the high priced cars,  
motor driven & hand operated.

PRICE from \$4.25 to \$15.00

Write for DEALERS' Proposition

The Sparks-Withington Co., Jackson, Mich.

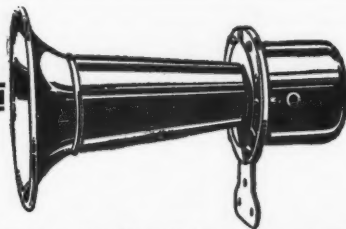
# Polarine

FRICION REDUCING MOTOR OIL

Maintains the correct lubricating  
body at any motor speed or heat

## STANDARD OIL COMPANY

(AN INDIANA CORPORATION)



Lowest Priced Electric Horn Obtainable

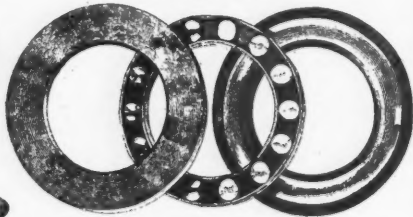
## REXON

\$3.85—Ready to Attach

Guaranteed for the Life of Your Car

THE GARFORD MFG. CO., 2503 Olive Street Elyria, Ohio, U. S. A.

The Bearings Company of America  
Sales Dept.: 250 W. 54th St.,  
New York



COMPLETE THRUST BEARING.

Manufacturers of Radial Ball Retainers, Thrust Ball  
Retainers, Complete Thrust Bearings

## B.F. Gram's Trucks



Appeal to the man  
who has had experience  
in the use of motor  
trucks.

To him their quality  
points, the individual  
clutch transmission,  
guaranteed springs,  
self-starter, etc., mean  
a definite saving in op-  
erating costs.

The full line, 1 to 6 tons, is described  
with all its features in our complete  
catalog, which will be sent you on request.

The Gram-Bernstein Company  
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# MARMON

"The Easiest Riding Car In The World"

"41"

\$3250

132" Wheelbase

"48"

\$5000

145" Wheelbase

Nordyke & Marmon Company  
Indianapolis (Established 1851) Indiana  
"Over Sixty Years of Successful Manufacturing"

## THE POWERFUL, SILENT SPHINX

\$695

A REAL AUTOMOBILE

The lightest, strongest, most serviceable and economical  
machine of its kind ever built.

112 inch wheel base. Electrically started and lighted.

Sphinx Motor Car Company, York, Pa.



**BROWN Jr.  
Tire Pump**

**NEW PRICE With Gauge  
and "T," \$5.50**

Built like a motor with lapped rings. A high grade pump at a small price for medium size tires. You cannot afford to run your car without this pump.

PATENTED  
NOV. 28, 1905  
NOV. 2, 1909  
AUG. 22, 1911  
OCT. 17, 1911  
NOV. 5, 1912  
FEB. 10, 1914  
OCT. 29, 1914

Send for Leaflet—  
Just Off the Press

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**HORN AND FAN**

Write for complete information about this new motor car horn, built by America's greatest manufacturers of fans. Something new and better. No gears, motor, batteries or wires to give trouble; gives warning signal by merely pushing button; gives any tone from polite whisper to loud, far-reaching noise; increases fan efficiency; never fails; long life; is easily interchangeable with fan on any car, in minute's time; requires no lubrication other than fan requires; a motor car horn is for safety—then get the SAFEST, most reliable and efficient horn—the Beartone. Write

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Write  
to-day for our  
Territorial Agreement  
on the

**New \$1000**

**Inter-State  
"FOUR"**

The one popular priced car with  
the greatest selling arguments  
in the country.

**Inter-State Motor Co.**  
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The numerous jets of the MASTER Carburetor  
break fuel finer. Hence better combustion  
with the present day low grade fuel.

**MASTER**  
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Yields more Power with greater Economy  
No Adjustments

LIVE DEALERS ARE WRITING FOR TERRITORY—YOU!

**Master Carburetor Corporation** Woodward & Hancock  
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Service and Satisfaction


The *only* set of tires to complete the  
entire 500-mile race at Indianapolis,  
May 30, 1913. Consider that 88 tires  
of other makes were changed in this  
race.

Our "Victory Folder" explains other races.

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Bull Dog  
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THINK THOUSANDS OF MILES  
AHEAD, AND YOU WILL BUY  
**REPUBLIC MILEAGE**  
PLAIN AND STANDARD TREAD  
**TIRES**

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BRANCHES AND AGENCIES IN THE PRINCIPAL CITIES

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25 years experience.

**DYNAMO CONTROLLERS**

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Magneto included in  
the specifications is  
evidence of the supe-  
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of that car.

Be Satisfied Specify Bosch

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**IT'S GETTING COLD**  
but your engine will start as quickly as in Summer  
and the cylinders will fire as regularly if equipped with

**Red Head**  
REG. U. S. PAT. OFF.

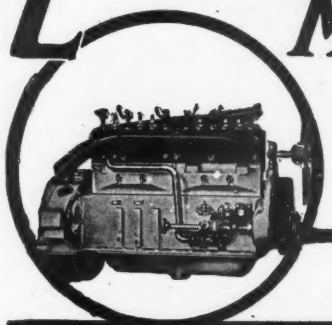
**1915 PRIMING PLUGS**  
Masters the motor at any temperature  
All Sizes \$1.25 Porcelain or Mica

**FORD DEALERS: Write for new price**

**EMIL GROSSMAN MFG. CO. Inc.**

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# Continental Motors

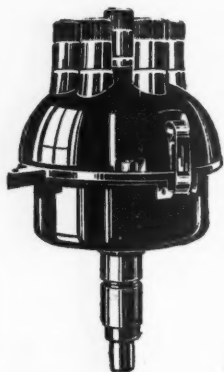


**FOURS**  
Model U, 2 1/2 x 4    Model C, 4 1/2 x 5 1/4  
Model N, 3 1/2 x 5    Model E, 4 1/2 x 5 1/4  
Model N, 3 1/2 x 5    Model T, 5 x 5 1/4  
Model C, 3 1/2 x 5 1/4    Model T, 5 1/4 x 5 1/4

**SIXES**  
Model 6-N, 3 1/2 x 5  
Model 6-P, 3 1/2 x 5 1/4    Model 6-C, 4 1/2 x 5 1/4

**Continental Motor Mfg. Co.**

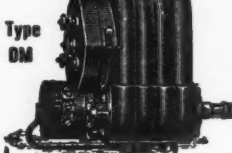
Detroit, Michigan  
Factory Representative, K. F. Peterson, 122 S. Michigan Ave., Chicago



*The*  
**Atwater Kent**  
Ignition System

Adopted by 60 Manufacturers in the Past Year

4934 STENTON AVENUE  
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**HEINZE**



The performance of HEINZE IGNITION APPARATUS  
for the past ten years justifies our claim that our product  
is superior in both points of construction and efficiency.

**HEINZE ELECTRIC COMPANY**

SALES OFFICES—DETROIT, MICHIGAN

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## OSGOOD AUTOLITE DEFLECTORS

have experienced a tremendous demand. More  
dealers are desired—also local managers in every  
city and county to extend distribution. Attractive  
proposition. Hurry! Ask for particulars.

This glareless glass fits any automobile headlight.  
Deflects rays without diminishing light. No glare.  
Avoids accidents. Equally good for city or country  
driving. Nothing else like it.

Endorsed by Chicago and other municipal authorities where  
glaring headlights are condemned. Retail \$5 the pair. Money-  
back guarantee. If your dealer cannot supply you, order direct.

**OSGOOD AUTOLITE DEFLECTOR COMPANY**

Dept. 12, 404 First National Bank Building

CHICAGO



**“Bridgeport”**

TRADE MARK



**TIRE PUMPS**

Are easy to use and easy to sell. They are durable and  
efficient and are widely advertised. The cylinders are of  
seamless brass tubing which cannot rust. The “Stapley,” the  
“Aeolus,” “Windjammer,” etc., give lasting satisfaction.  
Carry them in stock.

**Bridgeport Brass Company**  
P. O. Box A    Bridgeport, Conn.



**The All-Year Car**

Biggest idea of the year—  
closed car in winter—open  
car in summer.

Every inch  
a car

**KISSELKAR**

Every inch  
a car

The Two-Door Body and Detachable  
Sedan Top afford KisselKar owners all-  
weather service at but \$350 additional.

36-Four—\$1450  
42-Six—\$1650  
48-Six—\$2350

**KISSEL MOTOR CAR CO.**  
121 Kissel Ave., Hartford, Wis.



**Corcoran  
Lamps**

**GAS, OIL, AND ELECTRIC**

CORCORAN LAMP CO.  
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# The Clearing House of the Motor Car Industry

*For Second Hand Cars, Surplus Parts, Accessories, Tires,  
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**ADVERTISING RATES** 1/4 inch—One time, \$2.40. 1 inch—One time, \$4.50. 1 1/4 inches—One time, \$6.75. 2 inches—One time, \$9.75.  
Rates for other spaces and longer terms furnished upon request.

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### BARGAINS

One Maxwell Special, One Maxwell Mascotte, One Maxwell two-cylinder runabout, One 1914 Overland Speedster. All overhauled and in A1 condition. Address.

BUDA GARAGE, Buda, Ill.

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"Beaver Bullet"—Second American car to finish in the last Indianapolis Race. Car has run less than 1,600 miles and is in perfect condition. Address Chas. F. Keene, 550 Woodward Ave., Detroit, Michigan.

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Three 1 1/2-ton White passenger trucks, capacity 25 people. With special bodies, extra equipment and pay boxes, etc. Cost retail about \$4,500. Practically new, run irregularly for six months. If you could see them you would buy them. Address

GUY C. STOLTZ

Care of Marion Motor Car Co., Marion, Ohio

**FOR SALE**—Ford Cut-out Exhibition Chassis, enameled white, with railing, also pulleys, chain, etc., ready to attach electric motor. Price \$250.00.

THE SERVICE MOTOR CO., Fond du Lac, Wis.

## FOR SALE

One 1906 Packard Car  
One 1907 Packard Car  
One 1908 Packard Car

ALL IN DAILY SERVICE AND IN GOOD CONDITION

A number of De Tangle parts, Model "T" Buick parts, Sterling parts and Overland parts. Some of these are new and some have been used. All of above at sacrifice prices.

Merritt Bros. San Marcos, Texas

## FOR SALE

One 1911 Oldsmobile, one 1911 Packard "18," one 1912 Cadillac; all touring cars. T. K. Hays, Bloomington, Ill.

## GET OUR LATEST BULLETIN OF USED CARS

You will surely find one to fit your requirements. You can get from us good, serviceable machines of various makes for \$400 and up. Let our reputation be your guide.

PACKARD MOTOR CO. OF CHICAGO  
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Marion, 5-passenger, fully equipped, torpedo body, electric lighted and up-to-date in every way. Will sacrifice if taken at once.

CONDON, 2635 Wabash Ave., Chicago, Ill.  
Calumet 5311

### Mitchells Rebuilt, Guaranteed

These cars are fully equipped. Call or write for further particulars.

MITCHELL AUTOMOBILE CO.  
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### ONE HAYNES LIGHT SIX

Demonstrator, run 1,100 miles; in excellent condition; one extra tire; cash, \$1,200; out of factory only 90 days. J. Earl Bell, Rochester, Ill.

## Matheson

### Cars and Repair Parts

FRANK F. MATHESON, Wilkes-Barre, Pa.

### ONE 20 H. P. WHITE STEAMER

One 40 H. P. White Steamer; one 30 H. P. White gas car. Address

Box E 191, care Motor Age.

### Winton Six, 1914 Model

Run 6,000 miles. Fully equipped. Will guarantee first class condition. \$1,750 or make cash offer. No trade considered.

Theo D. Abeles, Little Rock, Ark.

## CARS WANTED

### Wanted—A Model 19 Buick

C. W. McCOLM

New Market, Iowa.

### 160 ACRES OF GOOD LAND

18 ml. west of Pierre, the capital of So. Dak.; all clear (or will take back a mortgage for \$800); to trade for a good car. Address Lock Box B, Dexter, Iowa.

## GARAGES, SHOPS, ETC.

### FOR SALE

## Best Possible Business Opening

In automobile business. Have been established in same location ten years; garage 110x150, no posts; all up-to-date shop equipment, large storage business; reason for selling, have other business which takes me out of city part of time. We are located in city of over 300,000 inhabitants and have agency for one of the most popular cars on the market, with large territory in most prosperous part of the U. S. Would retain interest with high-grade man if desired. Do not overlook this opportunity; will make appointment at Chicago show if interested. Address Box E264, c/o Motor Age.

## FOR RENT

### Fine Modern Garage

Good location, many autos in town and vicinity. Renter must purchase auto supplies and garage equipment, amounting to \$1,500.00. Rent reasonable. Address Box E258, c/o Motor Age.

### FOR SALE

Established garage and Auto livery; only garage in city of 2,000 pop. Reasons for selling, have other business.

MELLEN AUTO CO.  
Mellen, Wis.

## FOR SALE

Garage located in central Southwest; nice desirable business. For particulars, address Box E 231, c/o Motor Age.

**FOR SALE**—Garage equipment and small stock. Not much money required. Situated in wealthy community. Rent on building reasonable. Building 45x60. Reason for selling, other business. Address P. O. Box 153, Gibson City, Ill.

## FOR SALE

Garage in Northern Indiana Town. Good community and plenty of cars; purchaser must buy stock of supplies, which is small; building leased for term of years. Address Box E 275, care Motor Age

I Have a Fireproof Garage, 60x140 with three thousand dollars' worth of machinery, working five men. It is the best machine shop in a radius of two hundred miles. Will sell or lease it to good, responsible parties on easy terms. Address E. E. Roos, Box 696, Plainview, Tex.

## HELP WANTED

## WANTED

Manager capable of taking complete charge of a growing auto accessory house doing a local and national mail order business direct to consumer. Must know accessory mail order business from A to Z; must be capable of selling, buying, cataloging, and in fact taking complete charge of every little detail and willing to do any part of the minor work himself whenever necessary. Only those who have held similar positions, have first class references, and are willing to give full details in first letter need answer. Bonds required. Chance of lifetime for the man who can show results. All letters strictly confidential.

Address Box E 271, care of Motor Age.

## MACHINERY

### 50 LINCOLN MILLING MACHINES \$50 Each

Send for photo and description

LUCAS & SON, 5 Fox St., Bridgeport, Conn.

## MAGNETOS

ALL MAKES OF MAGNETOS and Coils recharged and repaired. Used Magnetos bought, sold and exchanged.

Largest Middle West magneto repair shop.

EMERSON MANUFACTURING CO.

217-221 Iowa St. Davenport, Ia.

### EXPERT REPAIRS MADE ON ALL MAKES OF MAGNETOS

Also independent high tension magnetos changed to dual for \$10. Mechanics trained by Bosch, and all work guaranteed. General Magneto Repair Co., 256 Halsey St., Newark, N. J.

### MAGNETOS REPAIRED

Bought, sold and exchanged. Bosch, Elsemann, Splidort, Mea. Expert repair work guaranteed.

### MAGNETO SALES CO.

1777 Broadway New York City



# The Clearing House—continued.

## We Repair All Makes of Magnetos and Coils

Complete stock of repair parts. Large stock of used magnetos. Get our prices.

**PELLET'S MAGNETO EXCHANGE**  
1606 Michigan Avenue, Chicago, Ill.

## MAILING LISTS

### 1915 Automobile Registrations

supplied on sheets or cards. Addressing, folding and mailing to auto owners. Special lists promptly compiled such as Ford owners, dealers, chauffeurs, etc.

**National Trade List & Addressing Co.**  
Albany, N. Y.

**MAILING LISTS AND STATISTICS.** Owners or dealers; any state, county, city; weekly and monthly supplements at lowest prices. Special lists of electric, trucks, Fords, Studebaker, Overland, etc. **MOTOR LIST CO. OF AMERICA**, 1107 Locust St., Des Moines, Iowa.

**New York Auto Lists.** Daily service covering 1915 registrations already started. Send \$10 for first ten thousand and get my proposition on the entire state or one district. **Peter Donnelly**, Box 9, Capitol Station, Albany, N. Y.

### 1915

**Auto Mailing Lists of All Lines for Sale**  
80,870 Auto Dealers, U. S. \$40.00 or \$2.50 per M  
6,200 Ford Dealers, U. S. 15.00 or 3.00 per M  
19,548 Garages, U. S. 30.00 or 2.50 per M  
20,924 Auto Supply Dealers, U. S. 30.00 or 2.50 per M  
21,983 Auto Repair Shops, U. S. 30.00 or 2.50 per M  
1,680,000 Auto owners. 2.00 per M  
533,000 Ford owners. 3.00 per M  
Have every other Auto Trade list.  
All typewritten, showing financial rating.  
Ask for particular territory wanted.

**A. F. WILLIAMS, Mgr.**  
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## MOTORIST'S BOOKS

### Parts and Accessory Manufacturers

Have you carefully investigated the motorcycle field? At least one hundred and ten thousand machines, averaging two hundred dollars each, will be produced in 1915. The most widely circulated journal and the best medium in the field is

### MOTORCYCLE ILLUSTRATED

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**"THE MODERN MOTOR CAR"**  
Just off the press—512 pages covering all phases of the Motor Car. 170 pages on Electric Starting and Lighting. Send for sample pages.

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of Gas, Oil and Steam Engines.  
Send for complete circular.

**CHARLES C. THOMPSON CO.**  
1130 S. Wabash Avenue, Chicago, Ill.

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### TRANSPARENT RAIN COATS

for Men and Women

That are waterproof, will not stick or peel, weigh 14 ounces, can be carried in pocket. Made to measure. Six colors. Samples material on request.

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Importing Agents  
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## PARTS AND ACCESSORIES FOR SALE

**A. A. A. A. ATTENTION \$4 to \$12**  
Selling out at one-half price the entire stock of the Service Storage Battery Co. 6-80 to 6-150 lighting, ignition and starting batteries.  
**SIMPLEX BATTERY CO.**  
120 E. 33rd Blvd. Chicago, Ill.

**AAA SPEEDOMETERS AAA**  
Send for special price list of Speedometer Parts.  
**GENERAL SPEEDOMETER REPAIR CO.,**  
53 W. 63rd St., New York City

### A TERRIBLE SIGHT IS A LINING OF A TOP WITH GREASE SPOTS AND ALL KINDS OF STAINS

One application of Peerless Lining Dye makes all linings a black uniform color. Ask your dealer.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

**ALL SEASON'S RECORDS MADE WITH**  
Schebler equipment. Why not get a Schebler model R for your car? Our exchange proposition makes it easy.  
**J. C. NICHOLS, Direct Factory Distributor**  
1673 Broadway New York

**AGENTS AND DEALERS**  
We announce a reduction of from \$20.00 to \$14.00 on our Spare Dismountable Wheels for the Ford. We have some good territory left. Why not handle an original line? Carry extra wheel with tire on ready and interchangeable with any of present wheels. Can install outfit at home, then change wheels in less than two minutes. Write for catalogue. Legitimate dealers, get our agency for Spare Wheels, Spring Radius Rods, Fan Belts, Radiators, Cradles, etc. **"ANGIER'S," Dept. B., Streator, Ill., U. S. A.**

### ALL PARTS IN STOCK AT DISCOUNT

Atlas, Bergdoll, Chalmers, Ewing, Alco, Packard, Hudson, Herreshoff, etc. Brown-Lipe Gear Parts, Continental Motor Parts, STA-RITE Rings, \$1.00 each. Regular Piston Rings, 80c each.

**JOS. C. GOREY & CO.**  
354 W. 50th St. New York City

**ALLEN'S SPECIAL BARGAIN BULLETIN**  
Just off the press. Write for it at once.  
**Fred Allen Auto Supply Co.**  
1610 Michigan Ave. Chicago, Ill.

### AMERICAN UNDERSLUNG PARTS AND REPAIRS

Exclusive Sales Representatives for Manufacturers who supplied Motors, Axles, Wheels, Transmissions, Steering Columns, Control Levers, etc., to the

**American Motors Company**  
Write for prices on parts needed in connection with American cars.  
**V. A. LONGAKER COMPANY**  
INDIANAPOLIS, IND.

**American Underslung and Marmont**  
Motor Car Parts and Service  
**CHARLES E. RIESS & CO., Inc.**  
1690 Broadway, New York

### AT BARGAIN PRICES

Send for our monthly bargain list on new and used dynamos, lamps and electric equipment for automobiles and boats.

**THE ESTERLINE CO.**  
223 E. South St., Indianapolis, Indiana

**AUTOMOBILE LEATHER FOR SALE;** about 7,000 feet. Best quality upholstery leather, full hides, very cheap. Samples on application.

**Philadelphia Machine Works**  
69-71 Laurel St., Philadelphia, Pa.

**Auto Parts (Any Make), Cut Prices**  
Leaders on piston rings  
**GROSSMAN AUTO PARTS CO.**  
White Plains, New York

## AUCTION SALE

**American Efficiency Survey of Motor Units Company.** These goods Were Sold on January 19th, and the Majority of Parts Purchased by the Auto Parts Company

Nickel plated "S" wrenches, each.....	\$ .03
6" nickel plated combination pliers, each.....	.19
Brown tire gauges, each.....	.60
6" black handle screw drivers, each.....	.10
Disco starters, each.....	2.00
Electric tall light, each.....	.85
Jewel top hoods, each.....	2.00
6 cyl. Elsemann magnetos.....	35.00
4 cyl. Elsemann magnetos.....	35.00
Waymaker horns, each.....	1.50
Magneto covers, each.....	.50
Firestone demountable wheels, less rims.....	4.00
Rims to fit above wheels.....	1.50
34x4" wire wheels, complete with rims, each.....	10.00
4 lb. air gauge.....	1.00
Spiltdorf magnetos, second hand.....	10.00
Truffault Hartford shock absorbers, Marlon, per pair.....	18.00
Spicer Universal Joints, each.....	6.00
Black Eagle plugs.....	.20
Tire locks with hardened chain, cloth covered.....	.50
Soot-Proof spark plugs.....	.25
Vasco spark plugs.....	.20
Stewart speedometer, Model 11.....	10.00
4 cyl. 2 cycle motor.....	75.00
2 cyl. opposed air cooled motor.....	35.00
5-passenger fore door body.....	50.00
Ford racing seats, per pair.....	22.50
100 lb. assorted nut, bolts and screws, per C.....	4.00
50 lbs. assorted rod ends, shackle links, spring clips and small automobile parts.....	2.50
Ford model T "V" shape radiators.....	28.00
We have a number of second hand radiators, thoroughly overhauled, guaranteed in first class shape from \$10.00 to \$20.00, to fit most any car.	
Weston-Mott shaft drive axles.....	25.00
Full floating shaft drive axles.....	50.00
Rear axles with transmission.....	65.00
I-Beam front axles.....	10.00
4 cyl. Remy coils.....	6.00
4 cyl. Spiltdorf coils.....	7.00
Ford wheels with solid tires, per set of four.....	30.00

Send for our No. 915 Bargain Sheet

### Auto Parts Company

Dept. O

737-9 W. Jackson Blvd.  
Chicago

## AUTOMOBILE PARTS

### MICHIGAN, MORA AND DRAGON PARTS IN STOCK

We maintain a complete stock of parts for the above cars.

**PHILADELPHIA MACHINE WKS.**  
67 Laurel Street, Philadelphia, Pa.

**AUTOMOBILES, BODIES AND PARTS**  
New and second hand for many makes of cars for sale cheap. Write us when in need of parts.  
**GEO. SCHMITZ & BROS.**  
666 Genesee St. Buffalo, N. Y.

**AUTO TOPS BUILT and REPAIRED**  
Seat covers and body building, remodeling and trimming. Write for prices.  
**BITLEY TOP & BODY CO.**  
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# The Clearing House—continued.

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### Do you know that a set of GLOBE SEAT COVERS

on your car will improve the looks 25%, save your clothes and protect the upholstery? Our direct-to-owner plan will save you money. Write for prices and samples of material.

Don't wait—do it now

**GLOBE SEAT COVER COMPANY**  
BOX 75—RACINE, WIS.

## AUTO SALVAGE COMPANY

1436 Wabash Ave., Chicago, Ill.

Model K Winton parts. D4 Bosch magneto, \$35. Type 10 Buick parts. Pope-Toledo parts for sale. 9K Stoddard-Dayton motor, \$100. 50 H.P. Royal Tourist motor, \$75.00. Prest-O-Lite tanks, \$9.00 each. DR4 Bosch Magneto, \$35.00. 6-Cyl. dual Bosch Magneto, \$50.00. 35 H.P. Continental motor, \$100. 4 speed sel. trans. with enclosed clutch, \$60.00. 2-Cyl. opposed Davis motor, \$40.00.

## BATTERIES

New and used factory prices. Give size and state if for ignition or lighting in first letter. Spark plugs 1/2" at \$2.00 a dozen.

**The Ampvo Battery Co.**  
3031 Michigan Ave. Chicago, Ill.

## BALL BEARINGS REGROUND

We guarantee them as

**GOOD AS NEW**

All sizes and makes in stock ready for immediate delivery—At prices that will interest you.

**AHLBERG BEARING CO.**  
2640 Michigan Ave., Chicago. 1790 Broadway, New York. 805 Woodward Ave., Detroit. 93 Massachusetts Ave., Boston. 1841 Euclid Ave., Cleveland, O. 325 W. Pico St., Los Angeles, Cal.

## CLEAN UP SALE

5-pass. fore-door, stream line bodies, upholstered and painted, all sizes and styles in stock, \$55.00 to \$85.00.

Model T Ford Delivery Bodies with top and upholstered seat, carrying space 57"x40", clearance under top 54", \$75.00.

Model T Ford Open Dely. body, flare side, boards, upholstered seat, finished, \$50.00.

E. M. F. Fenders, black enamelled—per pair, \$4.50; per set, \$8.00.

Spark Plugs—Each 4 for  
Fire Fly, 7/8-18 size only...\$0.25 \$1.00  
Auburn 1/2" size only..... .25 1.00

## Garage Assortment

1,000 asst. copper gaskets, all the popular sizes in round and flange types .....\$ 3.00

100 pounds asst. U. S. Std. and S. A. E. cap screws, nuts and bolts, clevis pins, wood screws, etc., etc. ....per box 6.00

60 pounds asst. rod ends, spring clips, spring shackles links, adj. yoke ends, plain yoke ends, timer and carburetor levers, clevis pins, etc., etc..... 3.50

Ford Model "T" radiators..... 16.00

High grade cylinder oil, 100 bbls. in the lot, while they last...per gal .16  
Sold in barrel lots only, about 50 gal. in bbl.

## THE M. & M. COMPANY

480-500 Prospect Ave. Cleveland, O.  
Do you want our catalogue? It's yours for the asking.

Cocoa and Carpet Mats, Hand Made Seat Covers, Auto Tops Built and Repaired.

**AUTO CAPE TOP CO.**  
2334 Michigan Ave. Chicago, Ill.

## CHANGE FORD TIRES IN HALF A MINUTE

You owners of Ford cars need worry no more about changing those clincher tires. Detroit's oldest department store is now marketing a new tire tool that will positively take off any clincher tire in 30 seconds, and it will replace it, too, in just that time. Will remove the worst rusted-on tire as easy as a new one. Quicker than demountable rims.

We will send it prepaid for \$1.00, and after two weeks' use if you do not say it is GREAT, you may return it, and we will send back your dollar.

## HEYN'S BAAZAR

DETROIT

MICHIGAN

## Commercial Bodies

For FORD CARS—14 STYLES

Painted or in Primer.

Reduced Prices on flare board and screen panel bodies to fit Poss cars

Motor Truck Bodies and Cab Tops

**Fayette S. Prouty,**

618 Second Ave. Detroit, Mich.

## Constant Exposure in All Weather Causes Decay

In Mohair, Duck and Canvas tops and curtains. Peerless Mohair Top Dressing adds new life, waterproofs and renews the finish. Ask your dealer.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

Croston, Michigan, F. A. L., Elmore, Deal, Midland, American, Henderson, Repair Parts Furnished. We also build and repair radiators, cylinders, crank shafts, etc.

## Department O

### AUTO PARTS COMPANY

737-39 W. Jackson Blvd., Chicago, Ill.

## CUT PRICES

Send for our illustrated cut price auto supply catalogue.

**Liberty Tire & Supply Co.**  
98 Chambers St. New York, N. Y.

## Eureka Diamond Honeycomb Radiator

"Will out-live your car"

All radiating surfaces—no fins—one of the most efficient coolers made. Very strong and handsome. Built in any size or design. New cores put in any radiator. Also Repairing. Absolute satisfaction guaranteed.

**EUREKA AUTO PARTS MFG. COMPANY**  
1915-17 Pine St. St. Louis, Mo.

## F. & H. WIRE WHEELS

Equipped with F. & H. Special Wire Wheel Rims. Adaptable to any car. Complete equipment for Ford cars.

**THE F. & H. WIRE WHEEL CO.**  
Columbus, O.

Fifty Gallon Portable Gasoline Tank, Bowser, cheap. Box E 265, c/o Motor Age.

Ford Cut-outs—Ford cut-outs with brass lock open pedal, complete, \$1.15; with enameled pedal, \$1.00.

Brass Hammers—Polished brass hammer with handle weight 1 lb., price \$0.65

Brass for Bushings—Cored brass for bushings, all sizes. Write for prices.

Lincoln Machine Shops, Lincoln, Ill.

## FORD DELIVERY BODIES

12 styles, all sizes. Agents wanted everywhere.

**COLUMBIA BUGGY CO.**  
21-23 Selden Ave. Detroit, Mich.

## FORE DOORS

Racing Seats

You can get complete doors and panels from us at a reasonable price.

**GET BUSY AND MODERNIZE YOUR CAR**  
Write for prices. We have all patterns. We also make racing seats, bodies, radiator covers, etc., etc.

**CHICAGO AUTO BODY CO.**  
1627 Michigan Ave. Chicago, Ill.

## Ford Flare Board Bodies

for mounting on rear of roadster body. Sizes 31 wide by 46 in. long, 10 inches high, \$25.00. F. O. B. Detroit. Size 31x60x10, \$28.00 F. O. B. Detroit. Bodies are strong and light, hinged tail gate. Painted black, rear lamp bracket and irons furnished, making it quickly interchangeable with turtle back.

## JOHN C. NAGEL

425-33 Baker St. Detroit, Mich.

## FOR SALE AT A BARGAIN

New 5x6 four-cylinder, governor-controlled engine, fully equipped, with carburetor, magneto. Will sell for much less than cost. **FRED HANSON**, 570 Prior Ave., St. Paul, Minn.

## FOR SALE

A small number of modern, well designed and constructed six, five and four-passenger touring bodies and comfortable roadsters painted and trimmed. Will change and guarantee to fit your car. Write us.

## IRVIN ROBBINS & CO.

Industrial Building, Tenth and Canal  
Indianapolis, Ind.

**FOR SALE**—Shaft drive rear axle and I-beam front axle with 30x3 wheels and tires (excellent condition). Suitable for light car or cycle-car. \$50.00.

**NORMAN BONAS**, Coulterville, Ill.

## Guaranteed New Radiators

You need a strong, well built radiator these winter days.

### HONEYCOMB RADIATORS

Ford T.....\$25.00  
Hupp.....25.00  
Buick 10, 24, 25, 34, 35, 36.....27.50  
Buick 16, 17, 19, 26, 27, 28.....37.50  
Buick 21, 38, 39, 43.....37.50

### FIN AND TUBE RADIATORS

Ford T.....\$20.00  
Buick 10.....25.00  
Buick 24, 25, 34, 35, 36, B24, 25.....22.50  
Buick 16, 17, 38, 39.....31.00  
Buick 19, 27, 28, 43.....28.00  
Buick 21.....30.00

Will ship on telegram same day C. O. D.

## Detroit Radiator & Specialty Co.

963 Woodward Ave. Detroit, Mich.

## INVEST 50c TODAY SAVE \$\$\$ TOMORROW

Washing and refinishing cost money. The B-B Dustless Auto Duster keeps your car new—saves you money.

### ONLY 50c PREPAID

Send for it. Satisfaction guaranteed.

**DUSTLESS SPECIALTIES CO.**

45 West 34th St., New York

# The Clearing House—continued.

## GUARANTEED RADIATORS

Not always necessary to buy new radiators. New cores can be furnished for frozen or damaged radiators. We build the fin and tube type. Guaranteed copper fins and tube.

We also repair and furnish new cores for Maya radiators.

We build new cores for all makes and for all cars. Get our prices. You will save money.

Cores in stock for many standard radiators such as Hupps, Warrens, Herreshoffs, Buicks, E. M. F. 30, Studebaker, Hudson 20, Cadillacs and several others.

We can build and fit a new core in your radiator in two days—if in stock, in one day.

Write for bargain sheet of accessories.

**HURON RADIATOR & LAMP CO.**  
253-255 Jefferson Ave., Detroit, Mich.  
Terms cash with the order.

### GARAGE OWNERS

There are good profits to be made handling our line of Ford Delivery Bodies; twenty styles to select from; write us for list and discounts.  
**HAYES-DIEFENDERFER CO.**  
21 W. 62nd St. N. Y. City

### LIKE A VARNISH IT CAN BE USED AS THE FINISHING COAT

Where the lustre has died out. Peerless Mirror-rod leaves a rich, full lustre on varnished surfaces; dry in four to five hours. Ask your dealer.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

### Lozier Repair Parts

We have on hand repair parts for Lozier Cars at reduced prices. Bring old parts for replacement.

**Philadelphia Machine Works**  
67-71 Laurel St., Phila.

### MAXWELL OWNERS AND REPAIRMEN

Why pay 20% advance for your repair parts for the old models of MAXWELL cars? We can supply 80% of your wants at the old list price. Transmission gears and parts in stock for Cadillac, Case, Croxton, Dorris, Elmore, Moline, Moyer, Oveland, Regal, Seiden, Stoddard, Velle and 75 others at cut prices. Why pay more? Send for price list.

**M. P. SUPPLY COMPANY**  
Atlanta, Georgia

### MICHIGAN OWNERS!

We can ship immediately every part for every Michigan car, no matter what the model. We purchased and are successors to the Michigan Motor Car Co. and have sole access to all patterns and engineering data. Every part guaranteed to be accurate. Shipment same day order is received.

**MICHIGAN MOTOR CAR PARTS CO.**  
Successors to Michigan Motor Car Co.  
KALAMAZOO, MICH.

### NICKEL PLATING

Auto parts replated. Carburetors, radiators and lamps made like new. High grade work at low prices.

**M. L. UDWIN CO.**  
550 W. Van Buren St. Chicago, Ill.  
Telephone Harrison 4848

### MORE SPEED FOR THE FORD

Special ratio Differential Gears for the Racy Type Ford.

2½—1 ratio.....\$15.00 Set  
3 —1 ratio..... 15.00 Set

Absolutely interchangeable with the present gearing

**DETROIT RADIATOR & SPECIALTY CO.**  
963 Woodward Ave. Detroit, Mich.

### NEW FORD TOURING CAR TOPS

Complete \$10 for 1913 and 1914. We can furnish tops for any make of car. Write for prices. All kinds of auto parts and accessories.

**NICHOALDS COMPANY**  
422-424 Grand River Detroit, Mich.

### No More Sticking of Tires

One coat of Peerless Rim Paint keeps the rims free from rust and allows the tires to be removed with ease. Ask your dealer.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

**NOTICE TO OWNERS OF WAHL CARS**  
We have bought the assets of the Wahl Motor Company of Detroit and can furnish all car parts promptly.  
**STREATOR AUTO PARTS SALES CO.**  
Streator, Ill.

## OVERLAND BODIES

Model 79 Overland touring bodies complete with top and wind shield, brand new.

\$150 Each

**Overland Motor Company**  
2426-2428 Michigan Ave.  
Chicago, Ill.

**NOTICE**—We can furnish promptly practically all parts for Nyberg Cars, also all axle and transmission parts for Midland Cars.

**STREATOR AUTO PARTS SALES CO.**  
Streator, Ill.

### Paint Your Car Yourself

Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

**Arsenal Varnish Company**  
Auto Dept. Rock Island, Ill.

**Prest-O-Lite Gas Tanks B.** \$10.50, Black and Nickel Windshields, \$6, Ford Gas and Electric Head Lamps, \$3.25 pair, Spark Plugs, \$0.25. One-third with orders.

**BENEDICT, 63 Winder St., Detroit, Mich.**

## RACING BODIES

Bucket Seats

Ford Delivery Bodies

See us at the Chicago Show

**AUTO REMODELING CO.**

1501-5 Michigan Avenue Chicago, Ill.

## PRICE WRECKERS

Our new Price Wrecker (catalogue) just printed quotes Dealers' prices on all accessories, motors, transmissions, tops, bodies, windshields, etc. Sent free on request.

### A FEW OF OUR BARGAINS

New Herschel-Spillman Motors 4 and 6 cylinder, \$275.00; other motors, \$85.00 up. \$300 Fore-door touring bodies now \$85.00. Runabout bodies—1914 Ford new \$35.00, others \$40.00 and \$50.00. Runabout tops \$15.00, Touring \$25.00 (measurement blank sent on request); Racing Seats \$10.00 each. Spicer Universal joints \$4.00 each; mechanical oilers \$4.00 up; windshields \$5.00 up; special nickel 1 piece Rainvision shield \$10.00; Disco self-starter \$5.00; Remy complete dual system magnetos Model R. L. and R. D. \$25.00; others \$5.00 up; Rayfield, Stromberg and Schebler carburetors \$5.00 up; gloves \$1.00 up. Raccoon Fur Coats (special bargain) \$18.00, double plush robes \$3.50 each, bulb horns 75c, electric horns complete with wire and button \$1.95, hand horns (mechanical) \$1.50, exhaust horns (all sizes) \$2.50, spark plug pumps \$5.00, double action pumps \$1.75.

### SPARK PLUGS

Special 5 for \$1.00, Mosler 4 for \$1.00, Timesco 8 for \$1.00; Bearings all \$1.00 up to \$5.00.

### SPRING SHOCK ABSORBERS

\$12.50 buys the latest in spring shock absorbers equal to the highest grade on the market selling at \$35.00. Easy to install. On all good cars as regular equipment.

Hartford-Mondex shock absorbers, \$5.00 each; Rims, detachable or demountable, \$2.50 and \$3.00 each; all makes and sizes. Storage batteries, \$6.00; tool boxes, \$1.00 and \$2.00; raincoats, \$1.90; rubber "slip-on" shirts, \$2.50, clocks, \$1.00 up; gas tanks, \$2.50; Prest-O-Lite (genuine) tanks style B, \$12.50 (complete).

### LAMPS

Side oil \$3.00 pair, side electric \$2.00 pair, tail oil or electric \$1.15, gas headlights, \$5.00 pair (large), electric headlights (large) \$7.00 pair; Gray & Davis large swivel searchlights \$9.00 each.

### RADIATORS

ALL MAKES at less than ½ price. Buick "10" \$19.75; Buick 16/17 \$36.00, Hudson "20" \$29.00, Hudson "33" \$29.00 new. Many others. Radiators repaired or traded in.

### FORD

exhaust horns, \$1.65; electric headlights, \$6.00 pair (Gray & Davis). Special Ford Holley carburetor, \$3.50. Set of 4 inclosed spring shock absorbers, \$7.50; master vibrators \$3.25-\$4-\$5.50. Automobiles and trucks, new and used. WAR PRICES. Send for special list and say what type you are interested in.

### TIMES SQUARE AUTOMOBILE COMPANY

(Largest Dealers in the World)  
1210 Michigan Avenue 1743 Broadway  
Chicago, Ill. New York City

Radiator—"THE CONSERVATOR"—Protector (Patent pending) Increases power, prevents freezing, prevents misting, increases efficiency and saves gasoline. Ford style, \$1.50. Dealers and agents wanted. Every Ford needs one.  
**JOHN J. HUDSON** Tarrytown, N. Y.

### RACING SEATS

High narrow back, very comfortable. Upholstered in high grade leather. Black, red, brown or any Spanish color. Special price, \$25.00. Chicago Auto Equipment Co., 319 So. Jefferson St., Chicago, Ill. Phone Wabash 7244.

### RADIATOR BARGAINS

Ford Model T Tubular.....\$16.00  
Ford Model T Honeycomb, V-shaped..... 25.00  
Buick 16 and 17..... 28.50  
Buick 10..... 20.00  
Hudson 20, 32 and 33..... 28.50  
Chalmers 30..... 30.00  
Everett 30 tubular..... 14.00

Write for prices on any other makes

**AUTOMOBILE APPLIANCE CO.**  
1436-38 So. Michigan Ave. Chicago, Ill.

Ship that troublesome Carburetor by Parcel Post. We rebuild and install new parts. Factory testing methods used. Service station for Schebler and Rayfield. All work guaranteed.

**WILLS CARBURETOR SPECIALIST**  
358 Belleville Ave. Newark, N. J.



# The Clearing House—continued.

## Remember

We are the original repair parts factory. We furnish repair parts for over fifty-three models of cars, such as Warren, Elmore, Marquette, Rainier, Welch-Detroit, Welch-Pontiac, F. A. L., Reliable Dayton, Barnes, DeLuxe, Demot, Michigan, Cutting, Northern, Queen, Wayne, Crow, Anhut, Herreshoff, Henderson, and many others. If you want any part for any auto, write us.

## Specials This Week

### TOPS

Cadillac tops, mohair, complete.....	\$22.00
E. M. F. Roadster.....	10.00
E. M. F. Touring Car.....	15.00
Chalmers 28.....	22.00
Hupp 20 Roadster, used.....	0.00
Maxwell Model 25.....	12.00
Buick Model 10 Touring Car.....	10.00
Paige Tops.....	12.00
Model T Ford, complete with curtains and top boot.....	18.00
(And many others)	

### RADIATORS

Ford T Honeycomb—guaranteed new.....	\$19.50
Ford T Honeycomb—V-shaped—guaranteed new.....	24.50
E. M. F.—all models.....	27.50
Oakland 42—V-shaped.....	30.00
Oakland 33-40-25.....	27.50
Hudson 20 Honeycomb.....	28.50
Bulcks, all models—guaranteed new. Get our prices.	

### REAR AND FRONT AXLES

¾ Floating Weston-Mott.....	\$25.00
Full Floating Sheldon Axles.....	50.00
Full Floating Lewis and Weston-Mott.....	75.00
McCue.....	50.00
E. M. F. 30 Rear Axles with Transmissions.....	65.00
Front Axles, all styles.....	10.00

### MAGNETOS AND COILS

4 cyl. Splittorf kick switch coils.....	\$ 8.00
4 cyl. Remy coils, Models S-T-RL and RD.....	0.00
4 cyl. Briggs coils.....	0.00
Splittorf Tubular Coils.....	6.00
4 cyl. Remy, Splittorf, Briggs, Helme and Pittsfield Magnetos, each.....	10.00
4 cyl. EU 4 Elsmann High Tension.....	25.00
4 cyl. High Tension Volta Magnetos.....	15.00

### SPARK PLUGS

Guaranteed regular 75c kind, ¼" Standard, ¾" A. L. A. M., while they last.....	6 for \$1.00
¾ Champion X, 39c each.....	4 for \$1.25
Motorcycle plugs, Metric, 25c each, 4 for.....	80c

### CARBURETORS

1½" Model G Rayfield.....	\$10.50
Model O Schebler, 1½".....	5.19
1" Kingston for Fords.....	3.00
1½" Kingston.....	3.95

### FOSTER SHOCK ABSORBERS

Complete with fixtures. Set of four, \$4.00

### REAL BARGAINS

11" Bullet Electric Headlamps, per pair.....	\$ 6.50
Electric Tail Lamps.....	1.25
Electric Bullet side lamps, per pair.....	3.00
Wheels—all sizes.....	3.00
Hand operated Horns.....	4.25
Clear Vision Windshields.....	7.90
Thermos bottles.....	Each, 1.45
Deaco Generators.....	18.50

### FORD GEARS AND WHEELS

Special 2½ to 1 and 3 to 1 Differential Gears, per set.....	\$15.00
Complete set of 4 30x3½ Demountable Wheels and 5 Rims for your Ford, complete with Rim Brace, etc., complete set.....	22.00

Write for bulletins.

## Puritan Machine Co.

Alfred O. Dunk, Pres.  
410 Lafayette Blvd. Detroit, Mich.

## RADIATORS

### NEW

### GUARANTEED

	Tubular.	Honeycomb.
Ford T.....	\$17.00	\$19.50
Buick 10.....	19.75	22.50
Hudsons, 20-33.....	20.00	20.00
Overlands.....	31.00	33.00

We have radiators, both tubular and honeycomb, to fit any car. Write us for prices before buying. Send in your old radiator for repair. We are experts. We'll make allowances on your old radiator.

### WORLD'S LARGEST DEALERS

in automobiles and accessories. Send for the great

### PRICE WRECKER

the money saver, covering everything pertaining to an auto.

## TIMES SQUARE AUTO CO.

56th and Broadway New York  
1210 Michigan Ave. Chicago, Ill.

### REPAIR PARTS

For Auburn, Colby, Halladay, Staver, etc. Send us broken parts of any car; we will duplicate them. Service station for Rutenber motors. Rear axle parts a specialty.

### AUTO PARTS CO.

1404 Hennepin Ave. Minneapolis, Minn.

### SEAT COVERS

For automobiles are rapidly becoming a necessity. Dealers and Jobbers who sell them are enthusiastic over our proposition. We make seat covers for Fords, Overlands, Buicks, Studebakers, Maxwells, Kritis and Dodge cars. Write for descriptive catalogue and samples.

### WISCONSIN AUTO TOP CO.

Racine, Wis.

## The Acme Cylinder Grinder

in combination with the Engine Lathe possesses all the features of the high priced manufacturing grinders. Only lathe attachment on the market that can grind en bloc cylinders without rotating them. For prices and particulars, write

## Robinson, Cary & Sands Co.

St. Paul, Minn.

## Sun, Rain, Snow and Sleet Eat Out the Life

Or oil, causing decay in leather, rubber and pantazote tops. Peerless Leather Top Dressing is an oil preparation which adds new life to old tops. Ask your dealer.

## THE COLUMBUS VARNISH CO.

Columbus, Ohio

**TWENTY-FIVE HIGH GRADE COUPE BODIES** for quick delivery. Write for prices, blue prints and specifications.

### IRVIN ROBBINS & CO.

11th St. and Canal Indianapolis, Ind.

**TANKS, HOODS, FENDERS, SEATS AND RADIATORS MADE AND REPAIRED**

We can duplicate any sheet metal part on any car.

### L. & M. MFG. CO.

319 S. Jefferson St. Chicago, Ill.

## We Tear 'Em Up and Sell the Pieces

We can save you money on Repair Parts or Supplies for your Auto

Can supply you with Crank Cases, Crank Shafts, Cam Shafts, Cylinders, Pistons, Connecting Rods, Radiators, Gears (any style), Timers, Magnetos, Coils, Carburetors, Manifolds, Water Pumps, Transmissions, Rear and Front Axles, Wheels, Steering Gears (complete), Steering Wheels, Gasoline Tanks, Wind Shields, Springs, Bodies, Seats and Cushions, Jacks, Tires and Tubes, Head Lamps, Side Lamps and Tail Lamps (any style), Prest-O-Lite and Search Light Tanks, Horns, Mufflers—in fact, any part of an auto.

We also buy old autos—condition no object—or any part of an auto, or if you want to trade parts we will trade with you.

OUR GUARANTEE TO ALL—IF NOT SATISFIED WITH YOUR BARGAIN, RETURN AND WE WILL REFUND YOUR MONEY.

### SPECIAL BERGAINS

New Ford Wheels, 30x3.....	\$ 2.00
Rain Vision Wind Shields, brass finish.....	10.00
Electric Horns with cord and push button.....	2.50
Umpf Timer, 2 and 4 cyl., new.....	2.00
Splittorf Magnetos.....	15.00
Mercedes Type Radiators.....	12.50
Electric Tail Lamps.....	1.25
Comb. Trunk and Tire Holder.....	1.50
Crank Shaft, Mod. T Ford.....	5.00

### Motors

We carry a large line of 2, 4 and 6 cyl. motors in stock. Send for list of same

## AUTO WRECKING CO.

Old Church, 13th and Oak  
KANSAS CITY, MO.

## YOU CAN SAVE MONEY

By Equipping Your Car with an  
Auto-Speeder

It is an automatic gas saver that is guaranteed to give satisfaction or money refunded. Price \$2.50. We want representatives in unassigned territory. Write us.

**AUTO-SPEEDER SALES CO. OF TEXAS**  
Corpus Christi, Tex. Box 729



# The Clearing House—continued.

## PARTS AND ACCESSORIES WANTED

### WANTED

Bowser Gasoline Tank and Pump. Must be bargain for cash. Send description and price. Address Box 4, Center June., Iowa

## PATENTS & PATENT ATTORNEYS

### C. L. Parker, Patent Attorney

Formerly member Examining Corps, U. S. Patent Office, 960 G St., Washington, D. C. Pamphlet of instruction sent upon request.

### PROTECT YOUR IDEAS

Send for free book and free search plan.

MILLO B. STEVENS & CO.  
53 W. Jackson Blvd., Chicago  
Established 1864 Main office, Washington

## RADIATOR AND LAMP REPAIRING

### A. A. A. Radiators Manufactured

Any make repaired and returned same day. Radiators to fit any car shipped in three days. New cores replaced in any make radiator. All work fully guaranteed. SHEPPARD CO., 1331 W. Jackson Blvd., Chicago, Ill.

ALL OUR RADIATOR REPAIRING GUARANTEED. New Radiators, Hoods, Fenders, Tanks and New Cores installed in old radiators at bargain prices.

ILLINOIS AUTO SHEET METAL WORKS  
58-60 E. 16th St. Chicago, Ill.

AMERICAN AUTO SHEET METAL WORKS  
We are masters of the trade. Manufacturers of Radiators, Hoods, Fenders, Gas Tanks, etc. Repairing a Specialty.

1446 Wabash Ave., Chicago, Ill.

### CHICAGO MFG. CO.

1466 Michigan Avenue, Chicago

We are the only radiator manufacturers in Chicago making a square tube radiator. New guaranteed cores placed in old radiators. We also manufacture Hoods, Fenders, Tanks and Pans and do guaranteed repair work. Prompt service.

## ONLY RADIATOR FACTORY IN NORTHWEST

Pioneer manufacturer. Why send your radiator down east when you can ship it to us; save time, expense, freight, money, and get best workmanship. Prices right. Make new radiators, allow for old one.

### TODD MANUFACTURING CO.

820-824 Mary Pl. Minneapolis, Minn.

## REBUILDING AND REPAIRING

### A. A. A.

### SCORED CYLINDERS

We fill your deep scored cylinders with a silver composition by our patented electric filling process. Remember! We also do a large welding business.

### L. LAWRENCE & CO.

Newark, N. J.

ALL KINDS OF AUTO RADIATORS, HOODS, fenders, lamps, windshields, etc., rebuilt and repaired. All work guaranteed. Phone or mail order. Telephone Calumet 4583.

L. BLUMENFELD & CO.  
1919 Wabash Ave., Chicago

### ANDRE G. CATELAIN

Everready Automatic Engine Starter. General machine work for foreign and American cars. Welding of all metals. Manufacturer Catechain Hose Coupling.  
1446-8 Indiana Avenue Chicago, Ill.

ANY MAKE OF RADIATOR MANUFACTURED or repaired. One day required for repairs; two days for a new radiator. Hoods, fenders, gas-line tanks, lamps, etc.

WABASH AUTO RADIATOR MFG. CO.  
1137 S. Wabash Ave. Chicago, Ill.

### ARROW RADIATOR REPAIR CO.

1331 Wabash Ave., Chicago, Ill.  
Expert repair work on Radiators, Hoods, Fenders, Dashes, Tanks and Drip Pans.  
We guarantee all our work  
Phone Calumet 1995

### CYLINDER GRINDING

on automatic machinery by skilled mechanics at prices that will interest you. Gears, axles, valves and parts of all kinds made of high grade alloy steel. Send us your worn or broken parts and we will replace them.

Oxy-Acetylene Welding  
of cracked cylinders a specialty.  
ADAPT MACHINERY CO.

1624 So. Wabash Ave. Chicago, Ill.

### CYLINDER REBORED

Including piston and rings.....\$7 to \$11

### STERLING ENGINE CO.

331 So. Clinton Street. Chicago, Ill.

## CYLINDERS REBORED AND REGROUND

Fitted with my light pistons and leakless rings.

Watch this space for the most startling announcement, my latest invention in a light PISTON.

### THE LEAKLESS PISTON RING FACTORY

McCADDEN MACHINE WORKS  
ST. CLOUD, MINN.

### M. & L. Auto Sheet Metal Works

Rebuild and repair radiators, hoods, fenders, tanks, lamps, etc. Tel. Calumet 2348.

1551 Michigan Ave., Chicago, Ill.

### NEVER LEAK PISTON RINGS

(Pat. applied for) increase power of motor—prices and circular on request. Cylinders reground, \$4.00 to \$9.00 per cylinder. Interesting proposition for Dealers.

GEO. I. TRUMP MFG. CO., Crown Point, Ind.

### CYLINDERS REBORED

Pistons and Tight Rings Furnished. General overhauling, crankshafts manufactured. Quality guaranteed. Prices interesting.

### HOPE MACHINE CO.

2310 N. Second St. Philadelphia, Pa.

### CYLINDERS REGROUND

Including new pistons and rings for \$5 to \$11 per cylinder. We do this class of work exclusively and are thus able to give you the highest class of work at these prices. Ford cylinders reground, including new pistons, rings and wrist-pins, for \$20.00.

### THE CROWN MACHINE SHOP

Crown Point, Ind.

CRANKSHAFTS, CRANKCASES, CONNECTING rods, pistons, scored cylinders made equal to new with our New Silver Iron process—use the same piston and rings. Powell-Elliott Auto Repair Co., 143 Rogers Ave., Cor. Sterling Pl., Brooklyn, N. Y.

### WE REGRIND CYLINDERS

Furnish our heat treated piston rings and pistons. First-class equipment, 15 years' experience. Write for our prices.

BRIDGEPORT PISTON RING CO.  
Bridgeport, Conn.

## SITUATIONS WANTED

### GENERAL MANAGER

or SUPERINTENDENT for the coach end of the automobile. Wide experience on high grade pleasure and commercial cars, invites correspondence from reputable manufacturers; credentials furnished as to character and executive ability to produce results; four years with present connection.  
Address "Executive," Box E 280 c/o Motor Age.

### MR. OVERLAND DISTRIBUTOR—

I am a salesman, know my business, have a record, am worth what I can earn and am at liberty Feb. 1st. Can you use me? Address Box E 279, c/o Motor Age.

### WANTED

Position as salesman, either city or traveling. Thoroughly competent in Automobile business. Best of references.  
Address Box E 282, c/o Motor Age.

### WANTED

Position, by competent driver as chauffeur, with party going to Exposition; four years' experience; good references. W. C. Romine, Downs, Ill.

### WANTED

Position by experienced automobile salesman. Four years' experience. Especially successful among farmers. No drinker. Address E-283, care Motor Age.

## STORAGE AND SHIPPING

### P. BRADY & SON CO.

Trucking and Storage. Automobiles and Bodies Stored. Automobiles boxed for export.  
552-558 W. 58th Street, New York  
Telephone 3440 Columbus

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34x4	9.00	10.00	3.58	4.36
35x4	9.00	10.00	3.68	4.56
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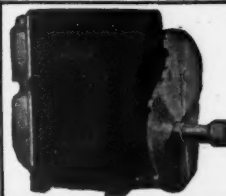


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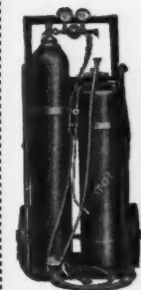
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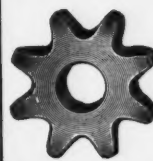


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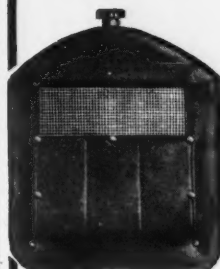
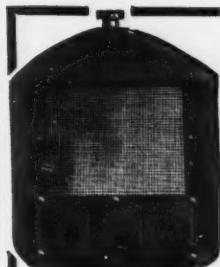
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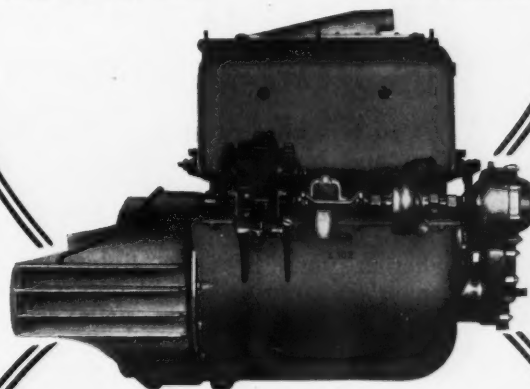
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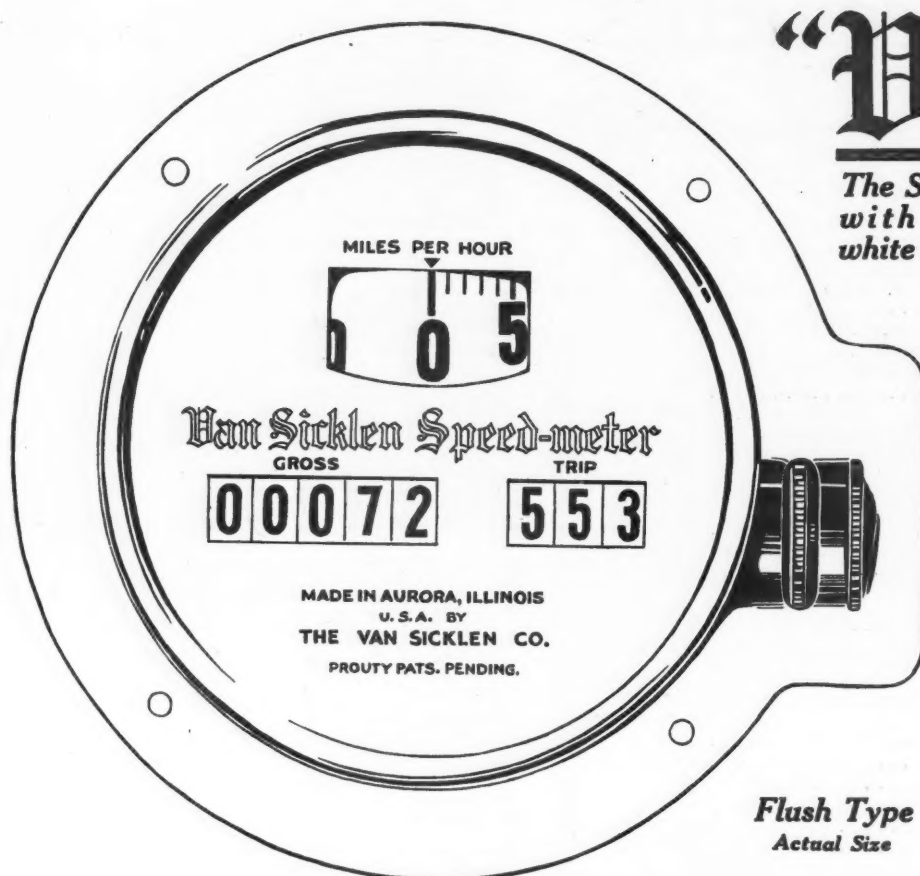


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Racing Motors Our Specialty  
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*The Speed-meter  
with the big  
white face - -*

*Flush Type  
Actual Size*

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Van is the easiest read speed indicator obtainable. He is plainly legible from the rear seat of the car.

Van's operation is based upon the infallible accuracy of a steady-flowing current of air.

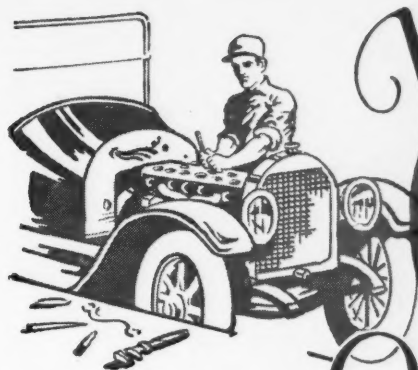
Van comes in two models—Flush Type for cowl board installation, and Special Bracket Type for Ford cars. Van is fully guaranteed in every particular. Prices and full information on request.

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AURORA ILLINOIS

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**Piston Rings**

EASILY  
ADJUSTED

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**and Motor Boats**



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## SCRIPPS-BOOTH 1915

### Aftermath

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